MINERALOGICAL ABSTRACTS

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New Minerals.

Jirkovský (Rudolf) & Ulrich (František). *Slavíkit, nový minerál.—Slavíkite, nouveau minéral.* Věstník Státního Geol. Ústavu Československé Republiky, 1926, vol. 2, pp. 345–351, 1 fig.

Among the weathering products of the Algonkian pyritic shales on the Valachov hill near Skřivaň, central Bohemia, a greenish-yellow copiapite-like mineral has been found, associated with halotrichite, pickeringite, gypsum, and a fibrous Fe-Mg sulphate (probably botryogen). This mineral, named slavíkite (after the abstractor), forms minute, almost microscopic, crystals with the rhombohedron $(10\bar{1}1)$ and the base (0001) equally developed, or tabular parallel to (0001); $a:c = 1:1{\cdot}03$. Optically negative, ω 1·530, ϵ 1·506 (Na); pleochroism distinct, ω lemon-yellow, ϵ almost colourless. Sp. gr. 1·905. Analysis gave SO_3 34·06, Fe_2O_3 20·08, Al_2O_3 4·29, CaO 0·01, Na_2O 1·63, K_2O 0·57, H_2O (+110°) 35·66, H_2O (−110°) 3·10, insol. 0·52, total 99·92. Formula, $(Na,K)_2SO_4.2Fe_5(OH)_3(SO_4)_6.63H_2O$. F. S.

Palache (Charles) & Shannon (E. V.). *Holdenite, a new arsenate of manganese and zinc, from Franklin, New Jersey.* Amer. Min., 1927, vol. 12, pp. 82, 144–148, 1 fig.

The pink to red orthorhombic crystals have $a:b:c = 0{\cdot}3802:1:0{\cdot}2755$, with the forms a(100), b(010), c(001), m(110), l(120), n(130), e(011), f(031), d(102), p(111), q(211), r(311), s(131), w(151), t(251), x(182), u(7.16.2). Sp. gr. 4·07, H. 4. Optic axial plane (010), $Bx_a \perp$(100), positive, α 1·769, β 1·770, γ 1·785, 2V 30° 20′. Analysis gave As_2O_5 17·40, MnO 37·75, FeO 1·80, ZnO 28·08, CaO 3·80, MgO 1·45, H_2O 6·62, total 98·91. Deducting 7·38 % willemite and 2·49 % calcite, this gives $12R''O.As_2O_5.5H_2O$ or $8MnO.4ZnO.As_2O_5.5H_2O$. This is still more basic than chlorophoenicite [M.A. 3–273]. Only a single specimen of the mineral on massive franklinite ore has been found. [See Min. Mag., vol. 20, p. 455.] L. J. S.

Palache (C.) & Bauer (L. H.). *Cahnite, a new boro-arsenate of calcium from Franklin, New Jersey.* Amer. Min., 1927, vol. 12, pp. 77–78, 149–153, 1 pl., 1 text-fig.

The few minute colourless glassy crystals first found several years ago were thought to represent a 'calcium edingtonite'. They are tetragonal-

sphenoidal and invariably consist of interpenetrating twinned tetrahedra, with $a : c = 1 : 0{\cdot}615$, forms a (100), p (111), o ($1\bar{1}1$), and perfect cleavage m (110). Sp. gr. 3·156, H. about 3; optically uniaxial, ϵ 1·663, ω 1·662. Analyses of larger but much etched crystals found more recently gave (one of three analyses) CaO 37·62, B_2O_3 11·86, As_2O_5 38·05, H_2O 12·42 = 99·95, agreeing with the formula $4CaO.B_2O_3.As_2O_5.4H_2O$. Associated minerals are axinite, willemite, rhodonite, &c. [See Min. Mag., vol. 20, p. 448.] L. J. S.

Palache (C.) & Bauer (L. H.). *McGovernite, a new mineral from Sterling Hill, New Jersey.* Amer. Min., 1927, vol. 12, pp. 373–374.

This was found in 1927 as coarse-grained masses with deep red-brown colour. It is optically uniaxial and positive with perfect basal cleavage and probably hexagonal. Sp. gr. 3·719, ω 1·754. Analysis gave: SiO_2 8·92, As_2O_3 4·45, As_2O_5 12·48, MnO 42·72, FeO 1·53, MgO 11·27, ZnO 10·22, H_2O 8·49, total 100·08, corresponding with $21(Mn,Mg,Zn)O.3SiO_2.\frac{1}{2}As_2O_3.As_2O_5.10H_2O$. The mineral is related to dixenite [M.A. 1–149]. The name appears only in the title printed as McGOVERNITE [and for international use it may presumably be written macgovernite]. L. J. S.

Ellsworth (H. V.). *Lyndochite—a new mineral of the euxenite-polycrase group from Lyndoch township, Renfrew county, Ontario.* Amer. Min., 1927, vol. 12, pp. 212–218, 2 figs.

This occurs with microcline, quartz, beryl, fluorite, &c., in a pegmatite dike. The black orthorhombic crystals are well developed but with rough faces, and the forms and angles are similar to those of euxenite. They show a brilliant conchoidal fracture with vitreous lustre. Thin splinters are reddish-brown and optically isotropic; powder pale-yellow. Sp. gr. 4·909, H. $6\frac{1}{2}$. Thin sections show that the material is much intergrown with columbite, which is difficult to separate. Analysis gave Nb_2O_5 41·43, Ta_2O_5 3·84, TiO_2 16·39, ZrO_2 0·04, SiO_2 0·07, SnO_2 0·12, PbO_2 0·37, UO_2 0·67, UO_3 0·04, ThO_2 4·95, $(Ce,La,Di)_2O_3$ 4·34, $(Yt,Er)_2O_3$ (at. wt. 105·4) 18·22, FeO 0·77, Fe_2O_3 1·32, MnO 0·59, Al_2O_3 + BeO 0·13, CaO 4·86, MgO 0·13, H_2O (+110°) 1·90, H_2O (−110°) 0·06 = 100·24. The mineral differs from euxenite in containing little uranium, some thorium and calcium, and higher niobium (which may be partly due to intergrowth with columbite). L. J. S.

Ellsworth (H. V.). *I. Uranothorite from the MacDonald mine, Hybla, Ontario. II. Alpha and beta hyblite—new sulfatic alteration products of the Hybla thorite.* Amer. Min., 1927, vol. 12, pp. 368–372, 1 fig.

Thorite (var. uranothorite) as square prisms $\frac{1}{8}$ to $\frac{1}{2}$ inch across is embedded in pegmatite. The mineral is black (in thin-section brown and isotropic) and very brittle with sub-conchoidal fracture; H. 4½–5, *D* 4·414, *n* 1·710. Analysis gave: SiO_2 19·56, ThO_2 46·33, UO_2 7·67, UO_3 9·46, PbO 1·32, $(Ce,La,Di)_2O_3$ 0·08, $(Yt,Er)_2O_3$ 0·36, Al_2O_3 + BeO 0·13, Fe_2O_3 0·75, FeO 0·43, MnO 0·07, MgO < 0·01, CaO 4·38, FeS_2 trace, insol. 0·15, H_2O (−110°) 3·57, H_2O (+110°) 5·67, He n.d., total 99·94. The Pb/U + 0·38Th ratio gives a low age for the mineral, possibly on account of alteration. When in contact with felspar the thorite is coated with a white opaque film, with sometimes an outer yellow resinous skin; while on the felspar there is a film of pyrite. These alteration products are called alpha-hyblite and beta-hyblite, and as determined by micro-chemical tests they appear to be hydrous sulphosilicates of thorium with some uranium, iron, and lead. They are optically isotropic with *n* 1·540–1·545 and 1·605–1·610 respectively. L. J. S.

Scrivenor (J. B.) & Shenton (J. C.). *Thorotungstite. A mineral containing tungsten and thorium from the Federated Malay States.* Amer. Journ. Sci., 1927, ser. 5, vol. 13, pp. 487–490, 2 figs.

This mineral is found as yellow masses at the base of alluvial deposits, worked for tin ore, occurring on granite in the Kramat Pulai mine, Kinta, Perak. The minute crystals have high refraction and birefringence with straight extinction, and are perhaps orthorhombic. Sp. gr. 5·55. Analysis gave WO_3 69·69, SiO_2 0·48, Al_2O_3 4·31, Fe_2O_3 1·35, ThO_2 16·00, rare-earths (mainly Ce) 1·77, ZrO_2 1·96, CaO 1·02, MgO trace, ign. (H_2O) 4·18, total 100·76. The formula, $2WO_3.H_2O + (ThO_2,Ce_2O_3,ZrO_2).H_2O$, suggests a relation to tungstite [T. L. Walker, 1908] with the addition of thorium, &c. The mineral is perhaps an alteration product of scheelite or wolframite, monazite, and zircon, all of which occur in the granite.

L. J. S.

Crawford (Wm. P.). *Weissite—a new mineral.* Amer. Journ. Sci., 1927, ser. 5, vol. 13, pp. 345–346.

This forms small lenses in a pyrite vein with native tellurium, sylvanite, petzite, rickardite, &c., in the Good Hope mine at Vulcan, Colorado. It is massive with bluish-black colour, tarnishing to black,

and with a black streak; H. 3, sp. gr. about 6. Analysis, Cu 45·85, Te 53·97, gives the formula Cu_5Te_3. [The mineral is evidently the same as rickardite, Cu_4Te_3, from the same locality. The name weissite is preoccupied.] L. J. S.

Cesàro (G.). *Sur la fraipontite, silicate basique hydraté de zinc et d'aluminium.* Ann. Soc. Géol. Belgique, 1927, vol. 50 (for 1926–7), Bull. pp. B 106–B 110, 1 fig.

A preliminary description, with analysis, of this mineral was given by the author in 1883 (ibid., vol. 10, p. cxi); it is now named fraipontite. The locality of the two specimens is unknown, but is probably Vieille-Montagne, Belgium. The mineral forms a fibrous layer 4–10 mm. thick on smithsonite. It is yellowish-white with silky lustre and resembles asbestos in appearance. It is optically negative and biaxial with axial plane perpendicular to the fibre. The old analysis by Pisani, SiO_2 20·1, Al_2O_3 13·9, ZnO 47·0, H_2O 13·2, CaO 2·0, CO_2 3·8, gives the formula $Zn_3(AlO)_4(SiO_4)_5.11H_2O$. Moresnetite approximates to the formula $Al_4Zn_8(SiO_4)_7.9H_2O$, and vanuxenite is explained as a mixture of hemimorphite and montmorillonite. L. J. S.

Duparc (L.) & Gysin (M.). *Sur la genévite, un nouveau minéral.* Bull. Soc. Franç. Min., 1927, vol. 50, pp. 41–46, 1 pl.

A mineral, previously described as dipyre, occurs as small grey prisms in limestone at Sidi bou Otmane, Morocco. The crystals are tetragonal (110) with cleavages (100) and (001); optically uniaxial and negative, ω 1·707, ϵ 1·698; sp. gr. 3·16. Analysis gave SiO_2 37·11, Al_2O_3 16·19, Fe_2O_3 3·05, FeO 2·53, MnO trace, MgO 2·17, CaO 33·67, Na_2O 0·46, K_2O 0·66, H_2O 2·70, ign. 1·01, total 99·55. These characters are compared with those of scapolite, gehlenite, fuggerite, and idocrase [and they seem scarcely sufficient to distinguish the mineral from idocrase]. L. J. S.

Amstutz (André). *Les roches éruptives des environs de Dorgali et Orosei en Sardaigne.* Schweiz. Min. Petr. Mitt., 1925, vol. 5, pp. 261–321, 1 pl., 9 text-figs.

An account of the geology with petrographical descriptions and chemical analyses of the rocks (crystalline schists, granite, dike rocks, effusive quartz-porphyry, Mesozoic limestone, Tertiary beds, and basalts) of this district on the east coast of Sardinia. A special type of basalt is named dorgalite. The olivine of the basalts is sometimes partly or completely altered to a red-brown material which is orthorhombic and in

parallel position with the original olivine, but different in optical orientation. In one kind, called 'traversite', γ, β, α are respectively parallel to β, γ, α of the olivine; and in another, called 'oroseite', γ, β, α are parallel to α, γ, β of the olivine. These 'new minerals' are incompletely described [and are evidently the same as iddingsite, M.A. 3–120]. Basic nodules and granite inclusions in the basalt are described. L. J. S.

Zechmeister (László) & Vrabély (Vera). *Über Telegdit ein fossiles Harz aus Siebenbürgen.* Centralblatt Min., Abt. A, 1927, pp. 287–290.

A fossil resin found as small pieces in the Cretaceous lignite at Szászcsór, Transylvania, is named telegdite. It is honey-yellow to yellow-brown: sp. gr. 1·09, H. $2\frac{1}{2}$, n_D 1·5416. Above 300° C. it softens and darkens. It is more readily soluble than ajkaite [M.A. 3–362] in alcohol 27 %, ether 33 %, chloroform 63 %. Analysis gave: C 76·93, H 10·17, S 1·73, O (11·17); N, halogens, and ash absent. L. J. S.

Lapparent (Jacques de). *L'alumine hydratée des bauxites.* Compt. Rend. Acad. Sci. Paris, 1927, vol. 184, pp. 1661–1662.

J. Böhm (1925) from an X-ray examination of certain bauxites concluded that the main constituent was an alumina monohydrate ($Al_2O_3.H_2O$) corresponding with lepidocrocite (isodimorphous with diaspore and goethite). Microscopic crystals in some bauxites from Ariège and Var are orthorhombic with the forms m (110), (001), and good cleavage (010), $mm = 63°$; optic axial plane (001), $\gamma = b$, birefringence about 0·020, refringence greater than that of hydrargillite. It is assumed that these crystals have the composition $Al_2O_3.H_2O$ and that they are identical with Böhm's 'bauxite', and the name *boemite* is suggested.

L. J. S.

Adam (H. R.). *A note on a new palladium mineral from Potgietersrust platinum fields.* Journ. Chem. Metall. Mining Soc. South Africa, 1927, vol. 27, pp. 249–250.

A silver-white to steel-grey mineral found in pannings of the platinum ore at Tweefontein farm, near Potgietersrust, Transvaal, contains Pd 70·4, Sb 26·0, insol. 1·4, Fe_2O_3 0·9 %; a second analysis by D. Millin gave Pd 70·35, Sb 27·97, near the formula Pd_3Sb. Sp. gr. 9·5, about. It is not attacked by HCl, and only slowly by HNO_3 or H_2SO_4, but is readily soluble in aqua regia. It occurs as small crystals in pegmatite eyes in shear-zones in banded ironstone which carries crystals of sperrylite [Min. Mag., vol. 21, p. 94]. L. J. S.

Gordon (Samuel G.). *A preliminary note on metavauxite, a new phosphate mineral from Llallagua, Bolivia.* Amer. Min., 1927, vol. 12, p. 264 (abstract).

The colourless to white acicular crystals are monoclinic and have $a:b:c = 1{\cdot}2044:1:0{\cdot}7272$, $\beta = 61°\ 19'$; α 1·550, β 1·561, γ 1·577, positive, $\alpha = b, \gamma:c = 17°$; Sp. gr. 2·34, H. 3. Formula $FeO.Al_2O_3.P_2O_5.4H_2O$. Simpler formulae are now given for the triclinic vauxite, $FeO.Al_2O_3.P_2O_5.6H_2O$, and paravauxite, $FeO.Al_2O_3.P_2O_5.5H_2O$ [M.A. 2–148]. These are compared with the formulae of lazulite and wavellite.

L. J. S.

Allen (Victor T.). *Ionite, a hydrous silicate of aluminium.* Amer. Min., 1927, vol. 12, p. 78 (abstract).

This mineral, $2Al_2O_3.6H_2O.5H_2O$, occurs in the Ione formation in California, and has been formed from biotite or chlorite. L. J. S.

Ahlfeld (Friedrich). *Bemerkungen zu A. Paulys „Bolivianit und Silesit, zwei neue Mineralien der bolivianischen Zinnlagerstätten."* Centralblatt Min., Abt. A, 1927, pp. 320–321.

Several errors are pointed out in the paper of A. Pauly [M.A. 3–112], and the supposed new minerals 'bolivianite' and 'silesite' are discredited, the former evidently being stannite and the latter a mixture of cassiterite and silica. L. J. S.

Schoep (Alfred). *Sur l'ianthinite, nouveau minéral uranifère.* Ann. Soc. Géol. Belgique, 1927, vol. 49 (for 1926), Bull. pp. B 188–B 192.

—— *Nouvelles observations sur l'ianthinite.* Ibid., pp. B 310–B 312.

—— *Over de vormen van curiet en van janthinietkristallen.—Sur les formes des cristaux de curite et d'ianthinite.* Natuurwetenschappelijk Tijdschrift, Antwerpen, 1927, vol. 9, pp. 1–3. [Flemish, with French résumé (p. 3).]

(1) Translation of previous paper [M.A. 3–232].

(2) Acicular crystals ($\frac{1}{2}$ mm.) of ianthinite were found with crystals of becquerelite and schoepite lining geodes in a specimen of uraninite from Kasolo, Katanga. The plane of the optic axes (001) is perpendicular to the elongation. Some of the crystals are bordered by a yellow zone which is perhaps becquerelite or schoepite; but other crystals completely changed to a yellow material have optical characters agreeing with neither of these, and on ignition they lose 8·6 % (instead of 12–13 % as for becquerelite and schoepite). A crystal of ianthinite heated at 50° in a

drop of water changes from violet to brown and finally to yellow; the result is another hydroxide of uranium different from becquerelite and schoepite. The ianthinite crystals lose 15·85 % on ignition, leaving U_3O_8; allowing for the gain in oxygen, the formula of ianthinite is perhaps $2UO_2.7H_2O$.

(3) Crystals of curite [M.A. 1–249, 3–233] have previously been measured only under the microscope. Goniometric measurements now give $a : b : c = 0{\cdot}9553 : 1 : 0{\cdot}6535$, with the orthorhombic forms (110), (111), (100). There is a good cleavage (100) or (110). Crystals of ianthinite gave $a : b = 2{\cdot}5938 : 1$, with the forms (110), (310), (100), and an undetermined bipyramid. L. J. S.

Schoep (Alfred). *Kristallografische medeleelingen, kristallen van kasoliet, soddyiet en brochantiet.* Natuurwetensch. Tijdschr. Antwerpen, 1927, vol. 9, pp. 25–30, 3 figs. [Flemish, with French résumé (pp. 29–30).]

New goniometric measurements are given of kasolite from Kasolo, Katanga, the angles of H. Buttgenbach [M.A. 2–42] being adopted, but $\frac{2}{3}\,c$ is taken, giving $a : b : c = 1{\cdot}8566 : 1 : 1{\cdot}0811$, $\beta = 76° 20'$, and the forms as (001), (100), ($\bar{2}01$), ($\bar{3}01$), ($\bar{4}01$), (111). The crystals are elongated along the *b*-axes, and two types are distinguished: (*a*) translucent and amber-yellow, (*b*) larger crystals, opaque and ochre-yellow. Soddyite crystals [M.A. 1–377] are orthorhombic with $a : b : c = 0{\cdot}7959 : 1 : 1{\cdot}6685$, and the forms (111), (113), (114), (001). Brochantite from Kipushi, Katanga, as acicular crystals in the direction of the *c*-axis, showed the forms (010), (140), (120), (340), (110), (410), (301) [Dana's axes]. L. J. S.

Schoep (Alfred). *Isomorfie van sklodowskiet met uranofaan.* Natuurwetensch. Tijdschr. Antwerpen, 1927, vol. 9, pp. 30–33, 1 fig. [Flemish, with French résumé (p. 33).]

Sklodowskite [= chinkolowbite, M.A. 2–341, 384, 3–115] is orthorhombic with $a : b : c = 0{\cdot}3114 : 1 : 1{\cdot}0554$, and the forms (010), (140), (110), (210), (100), (103), 101); cleavage (100) perfect. Optic axial plane (001), $Bx_a \perp (100)$. A comparison of the angles of sklodowskite with those of uranophane [= uranotile] (M. Websky, 1860) points to the isomorphism of these minerals:

	a : *b* : *c*
Uranophane, $CaO.2UO_3.2SiO_2.7H_2O$	0·3075 : 1 : 1
Sklodowskite, $MgO.2UO_3.2SiO_2.7H_2O$	0·3114 : 1 : 1·0554

L. J. S.

Schoep (Alfred). *Sur la buttgenbachite, nouveau minéral.* Bull. Soc. Chim. Belgique, 1925, vol. 34, pp. 313–314. [See M.A. 3–6.]

—— *Buttgenbachite et connellite.* Ann. Soc. Géol. Belgique, 1927, vol. 49 (for 1926), Bull. pp. B 308–B 310.

Buttgenbachite from Likasi, Katanga [M.A. 3–270] is no doubt hexagonal and isomorphous with connellite. It is optically *negative* with ϵ 1·747 and ω 'less than 1·747'. The formula is now written as $16CuO.2CuCl_2.Cu(NO_3)_2.19H_2O$, showing a close relation to the optically positive connellite, $16CuO.2CuCl_2.CuSO_4.19H_2O$. L. J. S.

Schoep (Alfred). *Description de cristaux de quelques minéraux du Congo belge (linnéite, rutile, cassitérite, uraninite et buttgenbachite).* Ann. Soc. Géol. Belgique, 1927, vol. 50 (1926–7), Bull. pp. B 215–B 222, 4 figs.

Minute (1 mm.) brilliant crystals of linnaeite isolated by dissolving in acid the dolomite of Luishia, Katanga, show the forms (111), (110), (113), (221), (661). Rutile and cassiterite (brown to colourless) crystals are described from Busanga. Uraninite as minute cubes lining cavities in pitchblende from Kasolo, Katanga, gave: uranium oxides as U_3O_8 92·86, NiO,Fe_2O_3 0·67, Te 0·13, SiO_2 0·26, PbO 7·93, total 101·85; sp. gr. 9·08. Buttgenbachite as delicate needles from Likasi showed the forms $(10\bar{1}0)$, $(31\bar{4}0)$, $(11\bar{2}0)$. L. J. S.

Chemical Constitution of Silicates.

Orcel (J.). *Recherches sur la composition chimique des chlorites.* Bull. Soc. Franç. Min., 1927, vol. 50, pp. 75–454, 4 pls., 15 text-figs.; Thèse Fac. Sci. Paris, 1927, ser. A, no. 1108, 380 pp., 4 pls., 15 text-figs.

An exhaustive treatise on the chemical composition of the chlorites, giving an historical review of the various theories on their constitution and tabulating 290 analyses. Detailed descriptions with new analyses are given of 19 chlorites representing various types [some of which have already been published in the author's earlier papers, M.A. 2–119, 184; 3–56, 57, 297]. These include two new types—an aluminous sheridanite from Comberousse, Savoie [not Isère, M.A. 3–56], and a magnesian thuringite from Messina, Transvaal. Empirical formulae only are given, and the analyses are calculated to the ratios SiO_2/R_2O_3, FeO/MgO, Fe_2O_3/Al_2O_3, and Cr_2O_3/Al_2O_3. On these ratios is based a new classification of the chlorites. I, Amesite, with $SiO_2/R_2O_3 = s = 1$. II, Corundophyllite group, $s = 1·33$ to $1·66$. III, Prochlorite group,

$s = 1{\cdot}66$ to $2{\cdot}33$. IV, Prochlorite-clinochlore group, $s = 2{\cdot}33$ to $2{\cdot}66$, V, Clinochlore group, $s = 2{\cdot}66$ to $3{\cdot}33$. VI, Clinochlore-pennine group, $s = 3{\cdot}33$ to $3{\cdot}5$. VII, Pennine group, $s = 3{\cdot}5$ to $4{\cdot}5$. VIII, Chlorites poor in alumina, $s > 4{\cdot}5$. Each of these groups is subdivided according to the ratios FeO/MgO and Fe_2O_3/Al_2O_3; but for the ratio Cr_2O_3/Al_2O_3 the Chromiferous chlorites are treated in the text as a special group IX. To fit this classification certain chlorites (aphrosiderite, thuringite, bavalite, daphnite, delessite, diabantite, leuchtenbergite, kotschubeite) have been re-defined, whilst other terms (rumpfite, chloropite, protochlorite, dumasite, pseudophite) are regarded as superfluous. Optical data are tabulated with the chemical ratios given above, and it is shown that chlorites of different chemical composition may in some cases differ only slightly optically (e.g. grochauites, clinochlores, and prochlorites). The methods of chemical analysis are given in detail, and dehydration curves were studied [M.A. 3–151]. Chlorites are usually thought to be secondary minerals, but they may also occur as primary constituents of igneous rocks. A bibliography of 243 items is appended. L. J. S.

Winchell (A. N.). *Chlorite as a polycomponent system.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 283–300, 4 figs.

Tschermak's end-members $H_4Mg_3Si_2O_9$ (antigorite) and $H_4Mg_2Al_2SiO_9$ (amesite) are accepted with the addition of the corresponding iron compounds $H_4Fe''_3Si_2O_9$ (ferro-antigorite) and $H_4Fe''_2Al_2SiO_9$ (daphnite), and in some cases small amounts of $H_4Fe''_2Fe'''_2SiO_9$ (cronstedtite), $H_4Mg_2Fe'''_2SiO_9$ (magnesio-cronstedtite), and $H_4Mg_2Cr_2SiO_9$ (kämmererite). Published analyses are plotted on a square with the first four of these compounds at the corners; and also for six components on a triangular prism. The optical data plotted on the same square show a relation with the chemical composition. A dividing line between optically positive and negative chlorites shows that for certain wavelengths some may be isotropic; thus explaining the anomalous interference-colours. It is suggested that there may be a change in the state of oxidation of the iron in ferriferous chlorites without destroying the crystalline structure. L. J. S.

Winchell (A. N.). *Notes on the triclinic pyroxenes.* Amer. Min., 1927, vol. 12, pp. 10–14.

Different minerals are included by different authors in this group. Rhodonite differs optically from artificial $MnSiO_3$ and calcium seems to be an essential constituent; the formula is written as $CaMn_5(SiO_3)_6$. Bustamite, $CaMn(SiO_3)_2$, is a distinct species. Other members of this

group (which perhaps does not belong to the pyroxenes) are pyroxmangite, sobralite, and vogtite, but they are not isomorphous. L. J. S.

Winchell (A. N.). *Further studies in the mica group.* Amer. Min., 1927, vol. 12, pp. 267–279, 2 figs. [Cf. M.A. 3–12.]

Hallimond (A. F.). *Studies in the mica group (a discussion).* Ibid., pp. 413–414. [Reply to A. N. Winchell.]

The muscovite and lepidolite systems are further considered, and additional analyses are plotted showing the variations in chemical composition and optical data. So that the muscovite and phengite formulae shall have the same number of oxygen atoms (to allow of miscibility) the latter is now written as $H_4K_2Fe''Al_4SiSi_6O_{24}$. The end-members of the lepidolite system seem to be the following molecules: lepidolite, $H_4K_2Li_2Al_4Si_6O_{22}$; polylithionite, $H_8K_2Li_4Al_2Si_6O_{22}$; protolithionite, $H_4K_2Fe_3Al_4Si_5O_{22}$; cryophyllite, $H_4K_2Li_2FeAl_2Si_7O_{22}$. The conclusions of A. F. Hallimond (Min. Mag., 1925, vol. 20, p. 305; 1926, vol. 21, p. 25) are criticized; and it is believed that the ratio $K_2O : SiO_2$ is not constant at 1 : 6, but may vary from 1 : 7 in phengite and cryophyllite to 1 : 5 in protolithionite. L. J. S.

Washington (H. S.) & Merwin (H. E.). *The acmitic pyroxenes.* Amer. Min., 1927, vol. 12, pp. 233–252.

A valuable series of accurate data (chemical, optical, and in some cases also density) was determined on carefully selected material from thirteen occurrences, representing artificial and natural acmite [and aegirine], hedenbergitic acmite, diopsidic acmite, acmitic diopside, &c. The molecular proportions of acmite (Ac = $Na_2O.Fe_2O_3.4SiO_2$), jadeite (Jd = $Na_2O.Al_2O_3.4SiO_2$), vanadous acmite (Vac = $Na_2O.V_2O_3.4SiO_2$), diopside (Di = $CaO.MgO.2SiO_2$), and hedenbergite (Hd = $CaO.FeO.2SiO_2$) are represented by formulae, e. g. for an acmitic diopsidic hedenbergite Ac 10. Jd 6. Di 17. Hd 60. Δ 7 (Δ representing the sum of such molecules as $FeO.SiO_2$, $Fe_2O_3.3SiO_2$, $Al_2O_3.3SiO_2$, &c.). Acmite proper often contains small amounts of zirconia and rare-earths. With admixture (in all proportions) of the hedenbergite, diopside, and jadeite molecules there is a decrease in the refractive indices and their dispersions and birefringences. L. J. S.

Gordon (Samuel G.). *On arfvedsonite, riebeckite, and crocidolite from Greenland.* Proc. Acad. Nat. Sci. Philadelphia, 1927, vol. 79, pp. 193–205, 6 figs.

Material collected by the author [M.A. 2–385] is further described. The following data are given for arfvedsonite from: I, Narsarsuk

(analysis I by H. S. Washington); II, Kangerdluarsuk (anal. by E. V. Shannon); III, Nunarsuatsiak (anal. by F. Wynkoop), crystals show the forms *m b c z k r i* [Goldschmidt's letters]. In all these the optic axial plane is perpendicular to (010), elongation and sign negative; pleochroism, α deep bluish-green, β brownish-yellow, γ usually blue-grey. The analyses are interpreted as mixtures of the arfvedsonite molecule ($R_2O.3RO.4SiO_2$), riebeckite molecule ($R_2O.R_2O_3.4SiO_2$), usually with an excess of R_2O_3, where R_2O is largely Na_2O, and RO and R_2O_3 chiefly FeO and Fe_2O_3 respectively.

	Sp. gr.	*mm* (cleavage).	β.	$\gamma - \alpha$.	$\alpha : c$.	SiO_2.	TiO_2.	Al_2O_3.
I.	3·465	55° 55′	1·705	0·005	10°	43·52	1·73	5·30
II.	3·447	56 8	1·696	0·005	15	43·08	0·83	4·44
III.	4·410	56 32	1·696	0·005	10	49·11	0·78	1·16

	Fe_2O_3.	FeO.	MnO.	CaO.	MgO.	Na_2O.	K_2O.	F.	H_2O.	Total.*
I.	11·12	22·39	1·13	2·21	1·09	7·39	1·83	0·88	1·20	100·26
II.	8·06	28·97	0·70	4·08	0·32	5·88	3·28	—	1·10	100·74
III.	9·23	25·50	1·13	0·77	0·18	8·01	2·89	0·29	1·12	100·05

* Totals less O for F_2. I, also ZrO_2 0·84. II, also BaO trace.

Riebeckite in parallel growth on aegirine crystals from Narsarsuk has optic axial plane $\perp$ (010), β 1·701, $\gamma - \alpha$ 0·005, $\alpha : c = 5°$. Crocidolite in parallel growth on arfvedsonite from Narsarsuk has sp. gr. 3·397, β 1·701, $\gamma - \alpha$ 0·005, $\alpha : c = 0°$. L. J. S.

Richarz (Stephen). *The amphibole grünerite of the Lake Superior region.* Amer. Journ. Sci., 1927, ser. 5, vol. 14, pp. 150–154.

—— *The relation of French and American grünerites to similar ferro-manganese amphiboles from Sweden.* Amer. Min., 1927, vol. 12, pp. 351–353, 1 fig.

Analysis of fresh grünerite, from Mt. Humboldt, Michigan, after separation of small amounts of calcite and magnetite, gave SiO_2 48·53, Al_2O_3 1·02, Fe_2O_3 1·14, FeO 39·20, MnO 0·66, CaO 1·31, MgO 4·06, K_2O 0·19, Na_2O 1·06, H_2O (over 110°) 1·71 = 98·88; sp.gr. 3·44. The material is light-grey with a yellowish tinge and forms minute laths. Extinction-angle 14–15°, 2V large, negative, α 1·666, β 1·684, γ 1·700. Compared with the original grünerite from France, this shows less FeO and more MgO, with correspondingly lower values for the refractive indices.

(2) The above are compared with the amphiboles described by N. Sundius [M.A. **3**–153], which contain less of the $FeSiO_3$ molecule and are

referred to dannemorite rather than to grünerite. Plotting the refractive indices and the specific gravity against the percentage of $FeSiO_3 + MnSiO_3$, they are also seen to belong to different series. L. J. S.

Jakob (Johann). *Beiträge zur chemischen Konstitution der Glimmer. III. Mitteilung: Die Methoden der chemischen Analyse.* Zeits. Krist., 1926, vol. 64, pp. 430–454.

The methods employed by the author for the chemical analysis of silicates are set out in text-book detail. L. J. S.

Ridley (Geoffrey N.). *Theories on the constitution of natural silicates.* Chem. News, London, 1925, vol. 131, pp. 305–308.

With organic silicon compounds the molecular weight can be determined. Ethyl orthosilicate $Si(OC_2H_5)_4$ and ethyl metasilicate $SiO(OC_2H_5)_2$ are analogous to olivine and enstatite respectively. The hypothetical polysilicic acids and aluminosilicates are mentioned. The structural formulae for felspar suggested by Vernadsky, Tschermak, and Groth are compared; and mention is made of W. and D. Asch's hexite-pentite theory. L. J. S.

Cesàro (G.). *Sur la formule à attribuer à quelques silicates Vésuviens.* Bull. Acad. Roy. Belg. Cl. Sci., 1926, pp. 350–368.

The usually accepted formulae of Penfield and Howe (1894) for the minerals of the humite group are criticized, and from their analyses (in discussion with some earlier analyses) the following formulae are deduced: chondrodite, $R''_{3\cdot1}\,R'_{1\cdot8}\,(SiO_4)_2$; humite, $R''_{3\cdot3}\,R'_{1\cdot4}\,(SiO_4)_2$; clinohumite $R''_{3\cdot5}\,R'_1(SiO_4)_2$. These represent basic orthosilicates in which R′ is (MgF) and (MgOH), and R″ is Mg and (Mg_2O), the last to account for the excess of oxygen. A discussion of published analyses of nepheline led the author in 1920 to consider this mineral as a basic diorthosilicate derived from the acid $H_6Si_2O_7$. He now offers a second solution in which the mineral is represented as a metasilicate of two types $Al(AlO)_9Na_{10}(SiO_3)_{11}$ and $Al(AlO)_{21}\,Na_{24}(SiO_3)_{24}$. L. J. S.

Goldschmidt (V. M.). *Zur Formel des Helvins.* Centralblatt Min., Abt. A, 1926, pp. 148–149.

It is pointed out that the ratios in the co-ordination formula of helvine as written by J. Jakob (1920) and modified by W. Fischer [M.A. 3–150] do not agree with the analyses. The ratio Be : (Mn,Fe,Zn) = 3 : 4 corresponds with the old formula $3R''BeSiO_4 . R''S$. L. J. S.

Goßner (B). *Der Wassergehalt von Olivin.* Centralblatt Min., Abt. A, 1926, pp. 307–313.

Special tests for water in six olivines from various sources showed H_2O 0·78–1·07 %. The materials were pure and contained not more than traces of serpentine. Most of the water was expelled at about 450°–500° C. and some at about 900° C. A gem chrysolite gave SiO_2 40·81, FeO 9·96, MgO 48·80, H_2O 0·90, total 100·47. It is supposed that the water is bound in some special way with the oxides shown in the author's silicate formulae [M.A. **2**–421]; and the same perhaps applies to such minerals as kornerupine, cordierite, and staurolite, in which 1–2 % H_2O presents a difficulty in the formulae. L. J. S.

Dittler (E.). *Chemisch-mineralogische Studien an Alumosilikaten.* Tschermaks Min. Petr. Mitt., 1926, vol. 37, pp. 1–26.

Comparative experiments were made with anauxite and cimolite from Bilin, Bohemia (analyses, M.A. **2**–306), kaolin from Zettlitz, Saxony (anal. I, $Al_2O_3.2{\cdot}3\,SiO_2.1{\cdot}8\,H_2O$), nacrite from Freiberg, Saxony (anal. II, $Al_2O_3.2SiO_2.2H_2O$), and pink montmorillonite from Paris, Maine, U.S.A. (anal. III, $2Al_2O_3.7SiO_2.10H_2O$).

	SiO_2.	Al_2O_3.	Fe_2O_3.	MnO.	MgO.	CaO.	$Na_2O + K_2O$.	H_2O.	Total.
I.	50·23	36·12	1·22	—	trace	0·40	0·64	12·12	100·73
II.	47·97	38·05	0·04	—	—	—	—	14·11	100·17
III.	50·02	23·28	0·65	0·32	2·08	1·10	0·44	22·13	100·02

The results are recorded of the action of water, sodium hydroxide solution, and of dilute HCl followed by NaOH. The amorphous cimolite is the most susceptible to change. Analyses are also given of fresh basalt and fresh augite from Debersche near Bilin and of the same when altered ('cimolized') to a white earthy material. Powdered augite when treated for two weeks with water or with sodium carbonate solution showed some alteration suggesting a commencing change to cimolite. L. J. S.

Raaz (Franz). *Zur Frage der Sillimanit-Umwandlung.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 583–590, 1 fig.

A single crystal of fibrolite heated at 1100° and 1200° showed no change, but when heated at 1600–1700° it changed in density from 3·247 to 2·950. It then showed white porcellaneous patches on the surface, and was found to consist of a mixture of mullite and silica-glass. Preliminary experiments with fibrous fibrolite heated at 1330° showed a change of density from 3·01 to 2·65, and in another sample heated at 1100° from 3·1558 to 3·0875. The latter changes are, however,

attributed to a mechanical loosening of the fibrous texture, rather than to any transformation of the material. This is supported by the fact that determinations of the electrical conductivity at temperatures up to 1350° fall on a continuous curve. L. J. S.

Bragg (W. L.). *The structure of silicates.* (Lecture.) Proc. Roy. Inst. Great Britain, 1927, vol. 25, pp. 302–310, 5 figs. Nature, London, 1927, vol. 120, pp. 410–414, 5 figs. [See M.A. 3–342.]

Rock-forming Minerals and Petrology.

Gillson (Joseph L.). *Biaxial calcite.* Amer. Min., 1927, vol. 12, pp. 357–364.

Several crystalline limestones and schists are noted in which the grains of calcite and dolomite show uneven extinction and biaxial optic figures (2V 4° to 14°). This is taken to indicate that the calcite has suffered an inversion from α-calcite at 970° C. [M.A. 3–192]. An optically biaxial character is also shown by fragments of calcite that have been artificially twinned by pressure. L. J. S.

Bowen (N. L.). *The carbonate rocks of the Fen area in Norway.* Amer. Journ. Sci., 1926, ser. 5, vol. 12, pp. 499–502. [See M.A, 3–193.]

Kerr (Paul F.). *The significance of strain structure in quartz from Ducktown, Tennessee.* Amer. Min., 1926, vol. 11, pp. 206–209, 2 figs.

Figures are given of a 'crossed ribbon structure' on the fractured surfaces of clear quartz (rock-crystal) from the Ducktown copper mines. Optical examination shows the presence of twinning and strain effects. It is suggested that this well-known rippled fracture of quartz, described by D. Brewster in 1821 and by J. W. Judd (Min. Mag., 1888 and 1892), is limited to high-temperature quartz especially in pegmatites [but no mention is made of its frequent presence in amethyst]. L. J. S.

Bindrich (Johannes). *Porphyrquarze vom Saubachriß i. Vogtland und vom Pöbelknochen b. Schellerbau i. Sa.* Centralblatt Min., Abt. A, 1925, pp. 203–210.

Porphyritic 'α-' [i. e. β- or high-temperature] quartz in the quartz-porphyry of Saubachriss and the granite-porphyry of Pöbelknochen in Saxony can readily be collected from the weathered rock. The groups consist of several crystals grown in parallel position or twinned on $(10\bar{1}1)$, $(11\bar{2}2)$, $(11\bar{2}0)$, and $(10\bar{1}2)$. [Cf. Min. Mag., 1922, vol. 19, p. 295; 1927, vol. 21, p. 366.] L. J. S.

Fenner (Clarence N.). *An unusual occurrence of albite.* Amer. Min., 1926, vol. 11, pp. 255–259, 1 fig.

Small pale salmon-pink crystals of albite are occasionally found lining cavities in the basalt of Paterson, New Jersey. Later minerals on the albite crust are calcite, chabazite, and prehnite. The crystals are elongated along the *a*-axis and tabular parallel to (010). Analysis (of material not quite free from prehnite) gave SiO_2 67·99, Al_2O_3 19·45, Fe_2O_3 0·22, MgO 0·20, CaO 0·37, Na_2O 11·01, K_2O 0·39, H_2O 0·40 = 100·03.

L. J. S.

Crawford (Arthur L.). *Euhedral oligoclase of pericline habit from Medicine Bow Mountains, Wyoming.* Amer. Min., 1926, vol. 11, pp. 239–246, 5 figs.

Crystals ($\frac{1}{8}-1$ inch) of oligoclase occur in a vein in a dike of metadiorite at Gold Hill. They are elongated along the *b*-axis and show the forms *c b m M x r* [Dana's letters]. The trace of the pericline twin-lamellae on (010) is at $+7°\ 52'$ to the edge *bc*. There is frequently a good parting parallel to the pericline twinning. Extinction on (010) $+3°\ 40'$, on (001) practically 0°. On cleavage-flakes, n_1 1·540, n_2 1·551. These characters indicate a composition near Ab_3An_1. The re-crystallized felspar of the dike has the composition Ab_7An_3. Vein felspars of pericline habit are usually albite.

L. J. S.

Goranson (Roy W.). *The determination of plagioclase feldspars.* Amer. Min., 1926, vol. 11, pp. 139–154, 4 figs.

A useful summary is given of the various methods for the determination of the plagioclase felspars, and the data are plotted on a series of diagrams. These methods are based on the values of the density, refractive indices, optic axial angles and sign, extinction-angles on (010) and (001), and in various sections ($\perp$ (001) and (010), zone $\perp$ (010), $\perp$ the α, β, and γ vibration-directions), in microlites and in twinned crystals. The accuracy of the different methods is pointed out and the effects of possible errors in orientation are tabulated.

L. J. S.

Vogt (J. H. L.). *The physical chemistry of magmatic differentiation of igneous rocks. II. On the feldspar diagram Or : Ab : An.* Skrifter Norske Vidensk.-Akad. I. Mat.-nat. Kl., Oslo, 1926, no. 4, 101 pp., 21 figs.

The more trustworthy published analyses of the felspars are calculated to weight percentages of Or, Ab, An and plotted on a triangular diagram. The K-Na-felspars (including microcline-perthite and anorthoclase) form

an almost continuous series near the line Or–Ab, a slight break between Ab_{30} and Ab_{40} being perhaps accidental, due to lack of good analyses. Several special points are considered in detail, e. g.: the composition of microcline and oligoclase in granite-pegmatite, and of adularia and albite formed at relatively low temperatures in Alpine veins and ore-deposits; the contents of Or in the plagioclases and of An in potash-felspars; the individualization boundary between orthoclase-sanidine-cryptoperthite-microcline and plagioclase-anorthoclase; the composition of the felspars as a function of the temperature of crystallization, and the exsolution in the solid phase of the perthitic lamellae. Tables are given showing the Or : Ab : An ratio in the rock, the separated felspars, and in the residual magma; and various equilibrium diagrams are given. L. J. S.

Drugman (Julien). *Note sur des types de macles dans les andésines du porphyre bleu de l'Estérel.* Bull. Soc. Franç. Min., 1926, vol. 48 (for 1925), pp. 254–269, 9 pls., 2 text-figs.

Photographs are given of 150 rough phenocrysts of andesine picked out from the weathered 'blue porphyry' of the Esterel Mts., Var, France. These illustrate several types of twinning—Carlsbad, Manebach, Ala (or Esterel), and Baveno (also albite and pericline as lamellae). Various habits of each of these are distinguished; and some more complex groups are combinations of two or more of these laws of twinning. L. J. S.

Lonsdale (John T.) & Adkins (W. S.). *Euhedral orthoclase crystals from Sierra Blanca, Texas.* Amer. Min., 1927, vol. 12, pp. 256–259, 6 figs.

The disintegration in an arid climate of a dike of porphyritic rock has set free numerous well-developed crystals of felspar. A large collection of these shows mostly simple crystals (of three types), and 6·47 % Carlsbad-, 9·17 % Manebach-, and 0·72 % Baveno-twins. An analysis of material with inclusions gave, after correction, Na_2O 4·467 %, indicating a soda-orthoclase. This is confirmed by the optical data: α 1·5180, β 1·5234, γ 1·5260, $a : a = 6° 37'$, 2V about 70°. L. J. S.

Duparc (L.) & Gysin (M.). *Sur les propriétés optiques de l'anorthite synthétique et sur les résultats comparés donnés par les différentes méthodes de détermination des plagioclases.* Bull. Soc. Franç. Min., 1926, vol. 49, pp. 63–76, 3 figs.

Thin sections from fragments of fused material, free from sodium, showed microlites of anorthite which were determined optically by the methods of Fedorov and of Fouqué and Lévy. The Fedorov method is

the better one, but the diagrams of Nikitin and of Duparc and Reinhard [M.A. 3–34] for use with this method are not yet quite accurate, since they indicate a composition An_{90} to An_{97} for this pure anorthite.

L. J. S.

Stark (M.). *Die Augite in den Gesteinen der Euganeen.* Neues Jahrb. Min., Abt. A, 1926, Beil.-Bd. 55, pp. 1–35.

A description is given of the microscopical characters of the augites in the volcanic rocks (limburgite, basalt, andesite, &c.) of the Euganean Hills, Padua, Italy. The birefringence varies from 0·023 to 0·032, 2V 32° to 70°, $c : \gamma$ 30° to 75°. L. J. S.

Kolderup (Niels-Henr.). *Zur Kenntnis der Hornblenden in den Gesteinen des Bergengebietes.* Bergens Museums Aarbok, 1925, for 1924–25, Naturvidensk. ræk. no. 1, 38 pp., 8 figs.

Describes the occurrences of hornblendes in rocks of various kinds (anorthosite, eclogite, gabbro, amphibolite, granite, &c.) in the Bergen district. In most cases the mineral has been derived from pyroxene, the green hornblendes from orthorhombic pyroxene (bronzite) and the brown from monoclinic (mostly diallage). Distinct pseudomorphs showing the form of the original pyroxene are, however, not found, so that the term 'uralite' is not strictly applicable. Chemical analyses are given of two green hornblendes and optical data for several green and brown hornblendes. Plots of these determinations, together with others taken from the literature, show an increase in 2V and γ with increasing FeO.

L. J. S.

Wheeler (E. P.). *Olivine from Monhegan Island, Maine.* Amer. Min., 1927, vol. 12, pp. 259–261.

An iron-rich olivine from an olivine-gabbro gave a corrected analysis: SiO_2 38·40, FeO 22·98, MgO 38·62 %. Sp. gr. 3·46, α 1·6807, β 1·7057, γ 1·7185 (Na). L. J. S.

Schauberger (Gerda). *Biotit in tertiären Eruptivgesteinen Böhmens.* Centralblatt Min., Abt. A, 1927, pp. 89–105.

An approximate idea of the amount of iron in biotites from different types of rocks was obtained by determining the optical constants: α 1·567–1·616, γ 1·620–1·697, $\gamma - \alpha$ 0·053–0·081. A table gives such data for thirty biotites from Bohemian volcanic rocks and from some other rocks. The conclusion is drawn that iron-rich biotites occur in acid rocks whilst magnesium-rich biotites occur in basic rocks; and that there

is no relation between the chemical composition of the biotite and the ratio of iron to magnesium in the enclosing rock. The same is also true of rhombic pyroxenes and olivines [M.A. **2**–437]. L. J. S.

Becke (F.) & Hibsch (J. E.). *Über Nephelin mit isomorpher Schichtung.* Tschermaks Min. Petr. Mitt., 1927, vol. 37 (for 1926), pp. 121–125, 8 figs.

Nepheline of two generations (porphyritic crystals 1 mm. across, and smaller crystals in the groundmass) in the plugs of nepheline-phonolite near Bilin and Brüx in Bohemia, show a zonal banding with variable refraction and ranging in sign from optically negative, through isotropic, to positive. This recalls the work of N. L. Bowen (1912) on the series of artificial mixed crystals of nepheline ($Na_2Al_2Si_2O_8$) with the anorthite substance ($CaAl_2Si_2O_8$). L. J. S.

Heritsch (Franz). *Studien über den Chemismus der Granaten.* Neues Jahrb. Min., Abt. A, 1926, Beil.-Bd. 55, pp. 60–91.

95 published analyses of garnet are calculated to molecular percentages of grossular ($Ca_3Al_2Si_3O_{12}$), &c., and are arranged in groups according to the preponderance of one or other of the molecules. They are also plotted on triangular diagrams showing the degree of miscibility of the different molecules. The types of garnets found in different kinds of rocks are noted. L. J. S.

Corbett (Clifton S.). *Leverrierite as a schist-forming mineral.* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 247–268, 1 fig.

The micaceous mineral leverrierite (near $Al_2O_3 . 2SiO_2 . 2\frac{1}{2}H_2O$) is difficult to distinguish under the microscope from muscovite, sericite, &c. A micro-chemical test for potassium is helpful, and the X-ray patterns by the powder method show differences. In certain schists, quartzites, and slates containing little or no potash, from Wisconsin, the micaceous mineral is believed to be leverrierite. L. J. S.

Foye (Wilbur G.). *The occurrence of thulite at Haddam, Connecticut.* Amer. Min., 1926, vol. 11, pp. 210–213, 3 figs.

A band in gneiss consists of labradorite (50–60 %), green epidote (25–30 %), and pink zoisite (thulite, 5–6 %), and evidently represents a calcareous sandstone altered by pegmatite. The epidote and zoisite (sp. gr. 3·19) are intimately intergrown. L. J. S.

Buerger (M. J.). *Optical notes on some of the variable contact minerals from Edenville, New York.* Amer. Min., 1927, vol. 12, pp. 374–378.

Some of the contact minerals from the limestone were examined. Phlogopite gave: α 1·546, β 1·580, γ 1·580, 2V 14° (differing from the usual data). Pargasite gave α 1·638, β 1·645, γ 1·654, 2V 80°, $\gamma : c = 31°$, positive; analysis by E. V. Shannon: SiO_2 42·50, TiO_2 0·63, Al_2O_3 15·65, Fe_2O_3 5·65, FeO 8·54, MnO trace, MgO 11·66, CaO 13·40, K_2O n.d., Na_2O n.d., H_2O 1·01, F n.d., total 99·04. L. J. S.

Zerndt (Jean). *Petrografja piaskowców z okolic Ciężkowic.—Petrographische Studien über Karpathen-Sandsteine der Umgegend von Ciężkowice (südlich Tarnow).* Bull. Intern. Acad. Polonaise Sci. Lett., Cl. Sci. math. nat. Ser. A, Cracovie, 1924, pp. 195–218, 2 pls.

—— *O mikroskopowych cyrkonach z piaskowców z okolic Ciężkowic.—Über mikroskopiche Zirkone aus den Karpathensandsteinen der Umgegend von Ciężkowice (südl. von Tarnow).* Ibid., pp. 219–229, 2 pls., 1 text-fig.

The Ciężkowice sandstone of Eocene age contains quartz 90·0, felspars 4·0, mica 2·0, heavy minerals 0·15 (including zircon 0·02), and cementing material 1·6 %, whilst the *Inoceramus*-sandstone of the same district contains quartz 40·0, felspars 37·0, mica 1·5, heavy minerals 0·1 (including garnet 0·06), calcareous cement 20·0 %. The former is particularly rich in zircon as small (0·2 mm. long), colourless, yellowish, or pale-rose crystals with the forms *m a p x*. L. J. S.

Davison (E. H.). *A study of the Cornish granite, its variation and its relation with the occurrence of tin and other metallic ores.* Trans. R. Geol. Soc. Cornwall, 1927, vol. 15, pp. 578–592, 1 pl.

The series of granite bosses from Dartmoor to the Scilly Isles are probably connected underground, and were no doubt all derived from the same magma reservoir. The texture of the granite at the margins of the masses, the metamorphism of the surrounding slates, and the distribution of dikes and veins are briefly discussed. Biotite in the normal granite gives place to tourmaline and muscovite in the mineralized areas. L. J. S.

Washington (Henry S.). *Granites of central Spain.* Journ. Washington Acad. Sci., 1926, vol. 16, pp. 409–412.

Four detailed analyses of biotite-granites show SiO_2 68·56–70·38 %. L. J. S.

Grout (Frank F.). *A peculiar shonkinite related to granite.* Amer. Journ. Sci., 1925, ser. 5, vol. 9, pp. 472–480, 5 figs.

At the margins of some of the granite masses in Minnesota are banded differentiates of syenite, shonkinite, and hornblendite. One spotted rock, distinguished as 'shonkinite (Basswood type)', shows white spots in a dark matrix. The spots (2–20 mm.) are rounded grains of felspar poikilitically enclosing grains of the dark minerals. The felspars range from microcline and orthoclase to albite and oligoclase, and the dark minerals are hornblende, augite, and biotite. L. J. S.

Gillson (Joseph L.). *The granite of Conway, New Hampshire, and its druse minerals.* Amer. Min., 1927, vol. 12, pp. 307–319, 3 figs.

The paragenesis of the minerals in druses and cavities in a narrow pegmatite dike in granite furnish a record of the various mineral changes that have taken place since the consolidation of the rock mass. Emanations (volatile or liquid) also pervaded the solid rock with the formation of deuteric minerals in the granite away from the pegmatite zone. Several references are given to the recent literature on such mineral changes, particularly to albitization. L. J. S.

Eckermann (Harry *von*). *The Gevle-diabase.* Geol. För. Förh. Stockholm, 1925, vol. 47, pp. 299–309, 4 pls.

A peculiar type of diabase is described from Gevle (Gefle), Sweden. A chemical analysis is given of the rock and micrometric analysis gives the mineralogical composition as: abradorite 48·2, iddingsite 6·9, ores (ilmenite and skeletal magnetite) 15·5, delessite 5·1, apatite 1·9, glass 22·4 %. The iddingsite (sp. gr. 2·862, γ 1·630, $\gamma - \alpha$ 0·038–0·046, negative and almost uniaxial) appears to be an iron-antigorite, $3FeO \cdot 2SiO_2 \cdot 2H_2O$, and represents a hydration product of fayalite by the magma water at the time of the consolidation of the rock. The delessite (n 1·603–1·615, $\gamma - \alpha$ 0·014, positive and almost uniaxial) was also formed at the same period. L. J. S.

Ross (Clarence S.). *A Colorado lamprophyre of the verite type.* Amer. Journ. Sci., 1925, ser. 5, vol. 12, pp. 217–229.

The Fortification dike near Craig in NW. Colorado has a width of 10–20 feet and extends for 10 miles like a wall 50–100 feet high. It consists at its margins of a glassy verite (or rather soda-verite, since it contains more soda than the verites of Spain). A finely crystalline verite with a sanidine base forms the greater part of the dike. Locally at the centre are a coarse-grained analcime-syenite (containing analcime 10 %,

thomsonite 4 %) and a medium-grained soda-syenite. An analcime-basalt is described from the same region. Chemical analyses are given of these rocks. L. J. S.

Stansfield (J.). *Chemical character of okaite.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 396–398.

An analysis of the rock okaite from St. Joseph du Lac, Quebec, is compared with previous analyses of monticellite-alnöite and nepheline-okaite [M.A. 2–539]. Sulphur is present as sulphate in haüyne, as monosulphide (Na_2S) in lazulite, and as disulphide in pyrite.

L. J. S.

Creveling (J. G.). *The peridotite of Presque Isle, Michigan.* Amer. Journ. Sci., 1926, ser. 5, vol. 12, pp. 515–521.

The fine-grained black rock contains augite, hypersthene, and olivine, all largely altered, together with magnetite, haematite, dolomite, kaolin, and serpentine. Of the last, six different varieties (including bowlingite, antigorite, and chrysotile) are distinguished by their optical properties.

L. J. S.

Daly (Reginald A.). *The geology of Ascension Island.* Proc. Amer. Acad. Arts Sci., 1925, vol. 60, pp. 1–80, 21 pls., 6 text-figs.

The rocks are all volcanic, the various types forming a series—olivine-basalt, basalt, trachydoleritic basalt, trachydolerite, andesite (?), and trachyandesite to alkali-trachytes and alkali-quartz-trachyte ('rhyolite'). Seven new chemical analyses are given of these rocks. During his visit to the island in 1921 the author prepared a geological sketch map showing the distribution of rocks of basaltic habit and of trachyte. L. J. S.

Daly (Reginald A.). *The geology of Saint Helena Island.* Proc. Amer. Acad. Arts Sci., 1927, vol. 62, pp. 31–92, 25 pls., 5 text-figs.

Basaltic flows (olivine-rich and olivine-poor basalts and trachydolerite) emanated in two centres from a network of fissures. The main massif is penetrated by pipes of phonolite and trachytic phonolite (soda-trachyte). Ten new chemical analyses are given of these rocks, and a geological sketch map is added. L. J. S.

Aurousseau (M.). *Analyses of three Australian rocks.* Proc. Linnean Soc. New South Wales, 1926, vol. 51, pp. 614–626.

Detailed chemical analyses are given of: (1) Nepheline-basanite from One Tree Point, Hobart, Tasmania, previously described as fayalite-basalt and melilite-basalt. The only minerals that can be identified in micro-

sections and crushed fragments are iddingsite and apatite, together with some pyroxene needles and ilmenite [no mention is made of nepheline]. (2) Microgranite from Ashford, New South Wales. This shows a graphic intergrowth of quartz and felspar. The Rosiwal micrometric analysis is discussed. (3) Amphibolite from Bunker Bay, Cape Naturaliste, Western Australia. L. J. S.

Lightfoot (B.). *Traverses along the Great Dyke of S. Rhodesia.* Southern Rhodesia Geol. Survey, 1927, Short Report no. 21, 8 pp., 3 + 1 pls.

Describes the northern and southern ends of the complex intrusion known as the Great Dyke, also two gaps in its course. At the north end the Dyke rises steeply to over 1,000 feet above the surrounding country. In this part the Dyke is mainly serpentine, with a minor development of enstatite-rock and norite, and the structure suggests that the last two have been intruded later than the rock which formed the serpentine. At the south end a synclinal sheet of enstatite-rock overlies serpentine. The structural planes of the surrounding granite appear to dip under the serpentine, but no actual junction can be seen. Chemical analyses and brief petrographical descriptions of five rocks are given.

S. J. S.

Rohleder (Herbert P. T.). *Das Giants Causeway Gebiet.* (*Co. Antrim in Nordirland.*) Zeits. Vulkanologie, 1927, vol. 10, pp. 232–267, 11 pls., 8 text-figs.

The structure of the basalt flows and dikes of the Giant's Causeway district are fully described and the history of volcanic activity is traced and explained in tabular form. The formation of lithomarge is ascribed to a period of rest and subaerial denudation, the main 18-metre band marking the pause between the outpouring of the lower roughly jointed basalt and the younger columnar basalts. Determinations of the density of the basalt at the centre and edge of a column 30 cm. in diameter gave for the central part 2·9011, for the margin 2·8573 as mean values, with 2·8815 for the intermediate part of the column. These confirm Delesse's figures published in 1858. The densities of pieces taken from the top and bottom of a column 20 metres high gave, for the upper part 2·8693, for the lower 2·8485 (? both taken from the marginal part of the column). Micro-sections of the basalt were cut in various positions and directions in the column, but they showed no visible differences. The lower density at the top of the column is attributed to the effects of rapid cooling at the surface, the lower part containing perhaps microscopic gas pores

formed during its slower solidification. The paper is illustrated by a map and 20 photographs showing the field relations of the basalts.

W. C. S.

Burri (Conrad R.). *Chemismus und provinziale Verhältnisse der jung-eruptiven Gesteine des pazifischen Ozeans und seiner Umrandung.* Schweiz. Min. Petr. Mitt., 1926, vol. 6, pp. 115–199, 44 figs. Separate as Inaug.-Diss., Zürich, 1926.

A statistical study of the chemical relations and distribution in petrographic provinces of the younger eruptive rocks of the Pacific Ocean and its coasts, based on about 1,800 analyses, which have been recalculated in the form adopted by P. Niggli in his 'Gesteins- und Mineralprovinzen' (1923), and from which differentiation-diagrams are constructed. The construction used is exemplified by a study of 878 analyses of the eruptive rocks of the North American Cordillera, which furnishes a mean type for the rocks of the circum-Pacific fold-mountain regions. The complete study, of which the printed paper is only an abstract, results in the confirmation of the existence in the Pacific area of rocks belonging to all the three provinces—Pacific, Atlantic, and Mediterranean. The distribution of rocks of the three provinces is shown to agree with that which obtains in other areas: the Pacific province being in the region of fold-mountains; the Atlantic in the inner-pacific region, e.g. the oceanic islands; and the small 'Mediterranean province' occupying an intermediate position. Further, the author is able to distinguish two types in the rocks of the 'Atlantic province' (the 'Hawaii' and the 'Tahiti' types); and five types and two sub-types in the rocks of the 'Pacific province'.

W. C. S.

Bowen (N. L.). *The origin of ultra-basic and related rocks.* Amer. Journ. Sci., 1927, ser. 5, vol. 14, pp. 89–108, 4 figs.

The fact that ultra-basic equivalents corresponding to anorthosite and peridotite are not known amongst volcanic and aphanitic rocks is taken to indicate that there have been no magmas of these compositions. Such ultra-basic rocks have originated by the local accumulation of crystals of lime-plagioclase or olivine.

L. J. S.

Meteorites.

Alvarez (Antenor). *El meteorito del Chaco.* Buenos Aires, 1926, 222 pp., 16 figs., 2 maps.

Gives the detailed history from 1576 to 1925 of the masses of meteoric iron found in the Campo del Cielo, a district partly in the Chaco Nacional and partly in the province of Santiago del Estero. The large

mass, estimated at 15 to 25 tons, found by Don Rubin de Celis in 1783 appears to have been recorded by Hernan Mexia de Miraval as early as 1576. A mass of about 1000 kg. (of which the 1400 lb. mass in the British Museum was the greater part) was found in 1803 at Runa Pocito. In 1913 pieces estimated to weigh about 1500 kg. were found at Pozo del Cielo (= Hoyo Rubin de Celis). In 1923 a large mass of 4210 kg., known as 'El Toba', was discovered at 'El Rosario'; in 1924 an implement of 2500 grams at Gancedo; and lastly in 1925 a large mass of 732 kg., known as 'El Mocovi', at 'Los Guanacos'. Analyses by E. H. Ducloux indicate that these last masses belong to the same fall and have about the same percentage of nickel (5·30 to 5·87) as the Runa Pocito mass analysed by O. Sjöström (Ni 5·11%). A 1530 gram mass of 'Pozo del Cielo' is in the La Plata Museum; the 'El Rosario', 'Gancedo', and 'Los Guanacos' masses and 350 grams of 'Pozo del Cielo' are in the National Museum of Natural History of Buenos Aires. G. T. P.

Ducloux (Enrique Herrero). *Datos químicos sobre el meteorito «El Toba» como perteneciente al grupo meteórico de Campo del Cielo.* Anal. Mus. Nac. Hist. Nat. Buenos Aires, 1925, vol. 33, pp. 311–318, 7 pls.; Revista Fac. Cienc. Quím. Univ. Nac. La Plata, 1925, vol. 3, pp. 117–12 8 pls.

A mass of meteoric iron known as 'El Toba' weighing 4210 kg. was found in November 1923 at 21 km. to the south-east of the railway-station Gancedo in the Campo del Cielo, Argentina. It is a nickel-poor ataxite of the Siratik group. Three analyses gave concordant results with percentages of Ni of 5·40, 5·87, and 5·75 respectively, and indicate the identity of the meteorite with other Otumpa masses. Traces of various platinum metals in the iron were distinctly identified. Analyses were made of various oxidized fragments of iron from the same region. The main mass is in the National Museum of Buenos Aires.

G. T. P.

Ducloux (Enrique Herrero). *Nota sobre el meteorito de La Colina.* Anal. Mus. Nac. Hist. Nat. Buenos Aires, 1925, vol. 33, pp. 287–295, 2 pls., 3 text-figs.; Revista Fac. Cienc. Quím. Univ. Nac. La Plata, 1925, vol. 3, pp. 65–71, 2 pls., 1 text-fig.

After detonations and the appearance of a fire-ball, a stone of about 2 kg. fell on March 19, 1924, at 11.30 p.m. near La Colina, Department of General Lamadrid, Buenos Aires. The stone is classed as an aumalite (Meunier's classification) and according to its chemical composition

as farmingtonose (Farrington's classification). The main mass is in the National Museum of Buenos Aires. G. T. P.

Pastore (Franco). *Descripción petrográfica de los aerolitos de La Colina y de Santa Isabel.* Anal. Mus. Nac. Hist. Nat. Buenos Aires, 1925, vol. 33, pp. 297–309, 3 pls.

Descriptions are given of the mineral constituents, olivine, pyroxene, and troilite and of the chondrules of La Colina (preceding Abstr.). The meteoric stone of Santa Isabel fell on November 18, 1924, at 9.30 a.m. about 2 km. south of Santa Isabel, province of Santa Fé, Argentina. It weighed about 5 kg., of which the principal mass of 3480 grams is in the National Museum of Buenos Aires. G. T. P.

Moraes (Luciano J. de) & Guimarães (Djalma). *Meteorito caido na Serra de Magé, municipio de Pesqueira, Pernambuco.* Bol. Inst. Brasileiro Sci., 1927, vol. 2 (for 1926), separate 4 pp., 2 figs.

On October 1, 1923, at about 11 a.m. a shower of meteoric stones fell on the Serra de Magé, 20 km. south of Pesqueira, after detonations lasting three minutes and appearance of a fire-ball coming from the south-east. Some fifty stones were recovered of which 34 are in the possession of the Geological Survey. Most of the stones were small and less than 5 cm. in length, some were 7 to 10 cm. in length, and the largest weighed only about 350 grams. The crust is thin and glassy and of a dark bottle-green colour. The stone has a density of 2·95 and consists of felspar (bytownite) and hypersthene with a little magnetite. For the felspar γ 1·583, 2V 79° ; for the hypersthene γ 1·705, 2V 51°, $\gamma-\beta$ 0·0027. Microscopic measurements gave the composition of the meteorite as bytownite 65·1, hypersthene 34·8, magnetite 0·1. Analysis by A. Girotto and D. Guimarães gave SiO_2 43·42, Al_2O_3 27·20, Fe_2O_3 2·07, FeO 4·79, MgO 3·18, CaO 14·53, Na_2O 1·59, K_2O 0·20, H_2O- 0·01, H_2O+ 1·71, TiO_2 0·18, MnO 0·58, S 0·04, Cr_2O_3 0·33, total '99·83'. [The stone appears to be a eucrite.] G. T. P.

Tschirwinsky (Peter) [= Chirvinsky (P. N.).] *Einige Worte über das System Eisen–Sauerstoff–Schwefel bei der Bildung der Steinmeteorite und über die mineralogische Natur und Genesis der schwarzen Adern solcher Meteorite.* Centralblatt Min., Abt. A, 1927, pp. 199–205.

The percentages of Fe, FeO, and FeS in Farrington's estimate of the average composition of meteoric stones corresponds approximately to the formula $2Fe+3FeO+FeS$, which the author suggests arose from the reactions $6Fe+3O+S=6Fe+SO_2+O=2Fe+3FeO+FeS$. The black veins in meteorites are considered to have resulted from cosmic auto-

pneumatolysis and to consist of free ferrous oxide (iozite) and troilite permeating the partially fused silicate mass together with iron and other constituents. G. T. P.

Tschirwinsky (Peter) [= Chirvinsky (P. N.)]. *Pallasit von Alten, Finnmarken, Norwegen.* Avhandl. Norske Videnskaps-Akad. Oslo, I. Mat.-nat. Kl., 1925, no. 7, 24 pp., 8 figs.

From traverse measurements and weighings of cuttings of photographs of eight polished plates (total area, 1845 sq. cm.) of the Alten pallasite, preserved in various museums, the average weight percentage of olivine is deduced as 61·22 (calculated from the vol. % 78·29; range of different determinations 68·81 to 89·46). From the composition of the olivine of this mass [M.A. 2–34] and the mean composition of nickel-iron of pallasites [M.A. 2–83] the bulk chemical composition is then calculated for this pallasite [though rather unnecessarily, it seems, to two places of decimals]. L. J. S.

Hobson (G. V.). *Six recent Indian aerolites.* Rec. Geol. Surv. India, 1927, vol. 60, pp. 128–152, 12 pls.

(1) The *Adhi Kot* aerolite.—After detonations coming from the north-west and appearance of smoke a stone which weighed 4239 grams was seen to fall on May 1, 1919, about noon at Adhi Kot, a village in the Shahpur district, Punjab. The stone is of pear-shaped form, has a density of 3·75, and is black and almost opaque even in thin-section. (2) The *Atarra* aerolite.—After detonations and appearance of a trail of smoke from north to south three stones weighing 591, 465, and 224 grams respectively, fell on December 23, 1920, at about 5.35 p.m. at the village of Turra four miles from Atarra railway-station. The stone has a density of about $3\frac{1}{2}$ and is classified as a black chondrite. (3) The *Haripura* aerolite.—On January 17, 1921, at 9 p.m. after detonations and appearance of light a stone, which broke into two pieces, fell at the village of Haripura in Jaipur state, Rajputana. One piece weighing 315 grams is preserved in the Museum of the Geological Survey, and the other in Jaipur Museum. The stone has a density of 2·76 and is classed as a carbonaceous chondrite. (4) The *Shikarpur* aerolite.—On August 9, 1921, at 9 a.m. after detonations a stone fell at Deari Shikarpur, a village in Purnea district of Bihar and Orissa province. The stone weighed 3679·7 grams, has a density of 3·60, and is classed as a veined white chondrite. (5) The *Muraid* aerolite.—On August, 7, 1924 at 2·30 p.m., after detonations, three stones fell of which two only were recovered.

These two fell at places a mile apart, one weighing 2925·67 grams at Muraid, and the other of 1777·59 grams at Mantala, in the Mymensingh district, Bengal. The two stones were found to fit together and the two faces of fracture were covered with a secondary fused crust. A striking feature is the flow structure from which the history of the flight of the stone can be reconstructed. The stone has a density of $3\frac{1}{2}$ and is classed as a white chondrite. (6) The *Jajh deh Kot Lalu* aerolite.—On May 2, 1926, between 5 and 6 p.m. after detonations a stone fell at the village of Jajh deh Kot Lalu in the Faizganj taluk of Khairpur state, Sind. Two pieces of 753·05 and 220·15 grams respectively which were recovered were said to have come from the same hole, but could not be fitted together. The larger piece is in the Museum of the Geological Survey in Calcutta, the other in Karachi Museum. The stone has a density of 3·6 and is classed as a veined crystalline chondrite. G. T. P.

Merrill (George P.). *A stony meteorite from Forksville, Mecklenburg County, Virginia.* Proc. U.S. National Mus., 1927, vol. 70, art. 21, 4 pp., 3 pls.

On July 16, 1924, at about 5.45 p.m., after loud detonations, four stones were seen to fall near Forksville. The weights of the stones were respectively 2250, 1850, 853, and 1114 grams. The meteorite is classed as a spherulitic chondrite. Analysis by E. V. Shannon gave : SiO_2 38·16, Al_2O_3 3·00, FeO 22·35, CaO 1·35, MgO 26·25, NiO 0·16, CrO_3 0·09, MnO trace, Na_2O 0·49, K_2O 0·26, P_2O_5 0·23, Fe 5·66, Co 0·041, Ni 0·78, Cu 0·005, S 1·14, total 99·966. Analysis of the insoluble silicate gave SiO_2 55·89, Al_2O_3 6·78, FeO 10·79, CaO 2·70, MgO 21·72, CrO_3 0·22, MnO trace, Na_2O 1·21, K_2O 0·64, total 99·95. The ratio of iron to nickel in the metal is about 7, [that of the molecules MgO to FeO in the insoluble silicates about $3\frac{1}{2}$, and in the meteorite as a whole about $2\frac{1}{2}$ (the ratio 1 to 1 given in the paper is that of weights not molecules)]. G. T. P.

Palache (Charles) & Lonsdale (John T.). *The Tulia meteorite, Swisher County, Texas.* Amer. Journ. Sci., 1927, vol. 13, pp. 353–359, 6 figs.

Two stones were found in 1917 while ploughing near the town of Tulia [and have been previously listed under the name Avoca; M.A. 3–252]. One weighing 14·88 kg. is now in the Bureau of Economic Geology (of Texas) and the other weighing 8·86 kg. in the Harvard Mineralogical Museum. The stone is a veined crystalline chondrite.

Analysis by E. V. Shannon gave: SiO_2 34·85, Al_2O_3 5·91, FeO 28·10, CaO 1·57, MgO 21·10, MnO 0·32, NiO 0·72, Na_2O 0·81, K_2O 0·50, Fe 3·54, Ni 0·59, Co 0·01, Cu, Cr traces, S 2·28, P 0·10, total 100·40; corresponding to metal 4·14, troilite 7·39, schreibersite 0·30, olivine 34·71, enstatite 25·64, felspar 12·02, FeO, CaO, Al_2O_3, &c., not allotted 13·47. Analysis of the insoluble silicate (amounting to 38·56%) gave SiO_2 21·55, Al_2O_3 3·45, FeO 3·26, CaO 1·11, MgO 7·88, Na_2O 0·81, K_2O 0·50. [In the analysis no allowance is made for the iron combined with the sulphur as troilite.] G. T. P.

Corbett (C. S.). *Another Kansas meteorite?* Amer. Journ. Sci., 1926, ser. 5, vol. 12, pp. 495–498, 3 figs.

A stone of 40–50 lb. was found some years ago in a hole in a wheatfield near Zenith, Spafford County, Kansas. It is composed mainly of anorthite, fayalite, and clinohypersthene. What remains of the stone weighing 14½ lb. shows no crust and is like a slag in containing many open vesicles. [Probably a slag.] G. T. P.

Lacroix (A.). *L'eucrite de Béréba (Haute-Volta) et les météorites feldspathiques en général.* Arch. Mus. Hist. Nat. Paris, 1926, ser. 6, vol. 1, pp. 15–58, 7 pls., 2 text-figs.

A more detailed account of the eucrite previously described [M.A. 3–93] and comparison with other eucrites and howardites. These two groups are chemically and mineralogically similar and only differ in texture [see Min. Mag., 1920, vol. 19, p. 63]. In the eucrites there is microscopic evidence of a fusion and recrystallization of pyroxene and more rarely of felspar with frequent partial dissociation of the pyroxene into free silica (quartz and tridymite) and magnetite. The black veins of fused material in the eucrite of Béréba are anterior to the fusion of the crust and are probably due to heat resulting from crushing: they are developed especially in the parts of the eucrite showing cataclastic structure. Analysis by Raoult of Béréba gave: SiO_2 48·48, Al_2O_3 12·25, FeO 18·49, MgO 6·50, CaO 11·12, and fractional percentages of Fe_2O_3, Na_2O, K_2O, TiO_2, P_2O_5, H_2O, Cr_2O_3, MnO, S, and Fe. A determination made on 0·037 gram of metal indicated that it is poor in nickel with Ni = 6·13%. Analysis by Raoult of the Teilleul howardite gave: SiO_2 48·14, Al_2O_3 11·35, Fe_2O_3 2·35, FeO 14·60, MgO 13·93, CaO 7·88, with small fractional percentages of alkalis, &c. A description is given of the Cachari eucrite. G. T. P.

Lacroix (A.). *Le fer météorique de l'oasis de Tamentit dans le Touat.* Compt. Rend. Acad. Sci. Paris, 1927, vol. 184, pp. 1217–1220.

—— *La composition et la structure du fer météorique de Tamentit. L'oxydation des fers météoriques à haute température.* Ibid., 1927, vol. 185, pp. 313–317.

(1) The mass was seen by G. Rohlfs in 1864 and later by E. Gautier. It weighs 510 kg. and is now in the Museum of Natural History, Paris. According to an old document it fell between Noum en Nas and Tittaf, and was brought to Tamentit towards the end of the fourteenth century. It is provisionally classified as a nickel-poor ataxite.

(2) The iron is a coarse octahedrite. An analysis by Raoult gave 8·39% of Ni, and one by Guillet 8·11%. In cutting the iron by means of an oxy-acetylene lamp at a temperature of 1580 C., it was noted that by the operation lasting seven minutes the octahedral structure was not altered beneath the resulting crust of oxide; and support was given to the theories of Wahl and Prior by the fact that the magnetite produced contained no nickel and that the drops of metal enclosed in the oxide of iron contained from 16·73 to as much as 37·07% of Ni. G. T. P.

Nieuwenkamp (W.). *De meteoorsteen van Ellemeet (na dien van Uden in 1840 en dien van Blauwkapel in 1843, de derde in Nederland).* Verslag Afd. Natuurk. K. Akad. Wetensch. Amsterdam, 1927, vol. 36, pp. 625–628, 1 fig.

Two meteoric stones fell on August 28, 1925, at 11.30 a.m. near Ellemeet on the island of Schouwen in Zeeland. One of 970 grams was preserved, but the other of ½ kg. remained in the soil until it was decomposed. The stone is described as a rodite consisting mainly of hypersthene and olivine. An analysis by N. Schoorl giving SiO_2 53·63, Cr_2O_3 1·82, FeO 18·95, MgO 25·65, MnO 1·35, S 0·42 is that of a metasilicate. G. T. P.

Neviani (Antonio). *Meteorite (aumalite) caduta il 16 ottobre 1919 nel territorio di Bur-Hacaba nella Somalia Italiana.* Boll. Soc. Geol. Ital. Rome, 1921, vol. 40, pp. 209–223, 2 pls.; 1922, vol. 41, pp. 1–16.

After detonations and appearance of a fire-ball many stones fell near Bur Gheluai. The meteorite is a grey chondrite and is described as an aumalite. Of the 121 stones found, the largest weighed 15·4 kg., five others between 4 and 8 kg., eight between 2 and 3 kg., twenty-one between 1 and 2 kg., sixteen between ½ and 1 kg., fifty-two between 101

and 500 grams, and eighteen between 10 and 100 grams. A list is given of African meteorite falls. G. T. P.

Michel (H.). *Der Meteorstein von Lanzenkirchen und seine Stellung im Systeme der Meteoriten.* Mitt. Wien. Min. Gesell., for 1926, no. 88, pp. 16–19 (in Tschermaks Min. Petr. Mitt., 1927, vol. 37).

Dittler (E.). *Die chemische Zusammensetzung des Meteorits von Lanzenkirchen.* Ibid., pp. 26–30.

Detailed analyses were made of the magnetic, non-magnetic, and soluble (in HCl) portions of both the darker (sp. gr. 3·52) and lighter (sp. gr. 3·45) parts of the Lanzenkirchen stone [M.A. 3–94]. The darker portion contains metal 2·33 (with Fe : Ni = 7·6), troilite 5·72, chromite 1·21%; and its olivine has the composition $2{\cdot}4Mg_2SiO_4.Fe_2SiO_4$. The lighter portion has metal 9·31 (Fe : Ni = 6·5), troilite 4·72, chromite 0·06%; olivine $3{\cdot}4Mg_2SiO_4.Fe_2SiO_4$. Both portions belong to the Baroti type of the chondrites. The stone contains much olivine with bronzite and clinoenstatite, but no felspar, together with some merrillite and glass, and only traces of apatite. L. J. S.

Schwarz (M. *v.*). *Das Gefüge des Meteoreisens von Unter-Mässing.* Centralblatt Min., Abt. A, 1926, pp. 145–148, 3 figs.

An etched section of the Unter-Mässing meteoric iron [M.A. 3–254], under a magnification of 166 shows well the taenite border to the kamacite, the granulation of the kamacite, and the eutectoid structure of the plessite. L. J. S.

Jung (August Otto). *Die Raumgitterstruktur und Gitterkonstanten des künstlichen und natürlichen Nickeleisens.* Zeits. Krist., 1927, vol. 65, pp. 309–334, 1 fig.

Pure iron and nickel and a series of iron-nickel alloys were examined by the Debye-Scherrer X-ray method (with wires) and by the Seemann-Bohlin method (with foils). Iron (Fe 99·3%) is body-centred cubic with $a = 2{\cdot}853$ Å., whilst nickel (Ni 99·7%) is face-centred cubic with $a = 3{\cdot}533$ Å. The several alloys (Ni 6·71 to 90·53%) are face-centred with a varying between 3·516 and 3·617 Å. Taenite (Ni 48·81, Fe 57·73, P 0·48%) from the Toluca iron is face-centred cubic with $a = 3{\cdot}601$ Å. The hexahedrite (Ni + Co 5·32%) of Mount Joy is body-centred cubic with $a = 2{\cdot}860$ Å., while the corresponding artificial alloy (Ni 6·71%) is face-centred with $a = 3{\cdot}592$ Å. L. J. S.

Fellenberg (Th. *von*). *Untersuchungen über das Vorkommen von Jod in der Natur. XI. Mitteilung. Zur Geochemie des Jods.* Biochem. Zeits. Berlin, 1927, vol. 187, pp. 1–6. [Cf. M.A. 3–197.]

Traces of iodine were found in nine meteoric irons and stones, the largest amounts 0·000018% in the Mocs stone and 0·000015% in the Toluca iron. Meteoric stones also contain up to 0·00056% Br. The 'Bomba' siderolite gave 0·0000015 I, 0·00024 Br in the metallic portion, and 0·0000105 I, 0·00018% Br in the silicate portion. L. J. S.

Lucas (Frederick A.). *Meteorites, meteors and shooting stars.* Guide Leaflet Series no. 64, Amer. Mus. Nat. Hist., New York, 1926, 24 pp. 1 pl., 14 text-figs.

A brief popular story. Pictures are shown of the large masses of the Cape York iron (Ahnighito, &c., 36½ tons, 3000 lb., and 1100 lb.) and Willamette (15½ tons) preserved in the museum. L. J. S.

Prior (G. T.). *Tektites.* Nat. Hist. Mag. (Brit. Mus.), 1927, vol. 1, pp. 8–13, 1 fig.

A brief account is given of moldavites, billitonites, and australites, and of the various views as to their origin. L. J. S.

Thurmond (F. LeRoi). *Is there a Canyon Diablo meteorite? Drilling has failed to find any in the famous Arizona crater.* Engineering & Mining Journal, New York City, 1926, vol. 122, pp. 817–818, 3 figs.

As drilling has failed to find the meteorite, the hypothesis of a volcanic steam explosion is taken as the origin of the crater. [Cf. M.A. 1–401.] G. T. P.

Economic Minerals and Ore-deposits.

Rosický (Vojtěch). *Železná ruda od Letovic.* [Iron ore from Letovice.] Příroda, Brno, 1926, vol. 19, p. 233.

Bean ores consisting of limonite and haematite were formerly worked in the Cenomanian north of Letovice in Moravia. Analysis by B. Konečný gave SiO_2 29·64, Fe_2O_3 44·49, Al_2O_3 12·35, MgO 0·36, CaO trace, H_2O 12·91, total 99·75. F. S.

Hynie (Ota). *Zpráva o nově otevřených žilách u Starých Hor na Slovensku.—Note sur les filons métallifères de la région de Staré Hory en Slovaquie.* Věstník Státního Geol. Ústavu Československé Republiky, 1925, vol. 1, pp. 25–27. [Cf. M.A. 2–463.]

Metalliferous veins were opened up in 1924 at Staré Hory near Španí Dolina (=Herrengrund). One shows a quartz filling with chalybite,

secondary copper and iron minerals, and primary chalcopyrite. Another is a quartz vein with chalcopyrite and native gold, but without chalybite. F. S.

Pálfy (Móric). *A rudabányai hegység geológiai viszonyai és vasérctelepei.* [The geologic relations and the iron-ores of the Rudabánya Mts.] A Magyar Kir. Földtani Intézet Évkönyve [Year-book Roy. Hungarian Geol. Survey], Budapest, 1924, vol. 26, no. 2, pp. 1–24, 1 geol. map, 7 text-figs.

Deals mainly with the geology of the Rudabánya Mts. (com. Borsod), which extend from SW. to NE. with continuation in the limestone region of com. Gömör. The rocks (phyllites, limestone, dolomite, marl, and quartz-breccia) are of Carboniferous and Triassic age. Along the range are some hot springs (21° C.). The main mass of the iron-ore is chalybite in depth with limonite in the higher levels. The mines were worked in earlier centuries for copper, and now for limonite together with small amounts of chalybite. It is thought that the chalybite is a hydrothermal metasomatic replacement of the Triassic limestone. Minerals occurring in the limonite are native copper, malachite, chessylite, galena, pyrite, marcasite, and baryte [M.A. **2**–388]. K. Z.

Cole (L. Heber). *Sodium sulphate of western Canada: occurrence, uses, and technology.* Canada, Mines Branch, Ottawa, 1926, no. 646, vii + 160 pp., i + xv pls., 22 maps, 16 text-figs.

Historical sketch of industry. Statistics and market conditions. General occurrence of natural sodium sulphate. Mineralogy. Physical and chemical properties. Uses. Technology of natural sodium sulphate. Manufacture of by-product salt-cake and glauber's salt. Allied products. General topography of the western plains. Origin of Canadian sodium sulphate deposits. Canadian occurrences of sodium sulphate with general description of deposits and particular description of twenty-five individual deposits. A. L. P.

Hall (A. L.). *The manganese deposits near Postmasburg, west of Kimberley.* Trans. Geol. Soc. South Africa, 1927, vol. 29 (for 1926), pp. 17–46, 8 + 1 pls., 5 text-figs.

These deposits are found in the northern part of the Cape Province, more than 100 miles west of Kimberley. The ore forms a single thick bed among ferruginous conglomerates and slates belonging to the Matsap System. The outcrop is continuous for forty miles, then disappears

beneath recent deposits. The manganese reef is from five to twenty feet thick, and dips westward at a low angle. The ore is massive psilomelane, with some pyrolusite and accessory rhodonite, pyrite, and—at one locality—a pink manganese-mica. A number of analyses are furnished, which show from 42 to 58 % of metallic manganese, with 3 to 10 % of metallic iron. Alumina is generally present, apparently in a bauxitic form, and there is a little silica, but only a trace of phosphoric acid. The ore in sight is estimated at about 2,700,000 long tons, and that underground, to a distance of 100 feet down the dip, at 18,000,000 long tons. The mode of origin of the ore has not been clearly established, but it is thought to be due to the replacement of argillaceous material by circulating solutions containing manganese. S. J. S.

Janisch (Edna P.). *The occurrence of phosphates in the Zoutpansberg district of the northern Transvaal.* Trans. Geol. Soc. South Africa, 1927, vol. 29 (for 1926), pp. 109–135, 1 pl., 8 text-figs.

Apatite occurs in lodes up to five or six feet thick in granite-pegmatites, especially about the junctions of pegmatite and basic schist. In some workings the apatite is associated with porous barium sulphate, in which the best crystals of apatite are found. The crystals are rough prisms, measuring from a few inches up to over two feet in length, terminated at one end by pyramidal faces; they often show pressure effects, having been twisted, broken, and recemented. The crystals enclose thin, flat needles of monazite, which also forms rounded grains in the pegmatite. The apatite is mainly the fluor-variety, but a little chlorine is present too, and the enclosures of monazite account for the presence of $1\frac{1}{4}$ to $1\frac{1}{2}$ % of rare-earths. The phosphoric acid is believed to have been derived from the mother-liquor of the pegmatite, and the lime from the basic schists. The barium sulphate is thought to be a replacement of some common mineral, possibly pyroxene. S. J. S.

Wagner (Percy A.). *Recent discussion on the origin of the Bushveld platinum deposits.* Trans. Geol. Soc. South Africa, 1927, vol. 29 (for 1926), pp. 145–147.

A critical commentary on the views expressed by M. Lipovsky regarding the genesis of the Bushveld deposits. The only new point brought out in the discussion is that, in the Potgietersrust area, practically all the platinum is present as sperrylite, but palladium, which is more abundant than platinum, is uncombined. S. J. S.

Wagner (Percy A.). *A new gold discovery in the Rustenburg district, Transvaal.* Trans. Geol. Soc. South Africa, 1927, vol. 29 (for 1926), pp. 95–108, 1 fig.

—— *Supplementary note on a new gold discovery in the Rustenburg district, Transvaal.* Ibid., pp. 141–143.

A sill of melanocratic soda-gabbro, intrusive in highly altered sediments of the Pretoria Series, has been found to carry gold. The thickness of the sill varies from three to fourteen feet; the footwall is quartzite, the hanging wall a metamorphosed ironstone, slabs of which are enclosed in the gabbro and partly digested by it. The gabbro consists of large augite crystals, with interstitial plagioclase and subordinate quartz, anorthoclase, and magnetite. Grains of native gold are often visible to the naked eye. A chemical analysis of the rock is furnished, and the mode has been measured by the geometrical method [but is printed incorrectly]; the proportion of gold so indicated is approximately 0·05 %. The grains of gold, which rise to 2·5 mm. in diameter, are generally associated with patches of secondary limonite, but some gold is also embedded in fresh augite and plagioclase. Picked specimens from the middle of the reef have assayed 20 ounces to the ton. In the second paper, the author records the occurrence of krennerite [? calaverite] in association with gold in this sill. S. J. S.

Macgregor (A. M.). *A geological reconnaissance in the Mafungabusi gold belt.* Southern Rhodesia Geol. Survey, 1927, Short Report no. 20, 13 pp., 1 map.

Auriferous quartz veins carrying copper sulphides are found both in the Basement Schists and in intrusive granite, but mainly within a few miles of the granite-schist contact. Pyrite, galena, chalcopyrite, and tetrahedrite are abundant below water-level. S. J. S.

Ungemach (H.). *Sur le gisement potassifère de Dallol (Abyssinie).* Bull. Soc. Franç. Min., 1924, vol. 47, pp. 12–32.

Mount Dallol, consisting of beds of salt and clay protected by gypsum and dolomite, rises some fifty metres out of the Plain of Danakil, an original arm of the Red Sea cut off by the coast ranges. Salt beds, iron-stained and containing potassium chloride up to 70 %, occur 600 metres to the south-west, where small hummocks rich in potash characterize the district and geodes of sylvine crystals are found. The deposits are caused by volcanic action still in operation, such as the emanation of dry gases and the flow of underground water, while dew and floods are further

factors. Brief descriptions are given of anorthite, diopside, olivine, and celestine from the lavas, and of sulphur, sylvine, halite, and carnallite from the salt-deposits. [Cf. M.A. **1**–324.] E. D. M.

Alexandrow (S. P.). *Radiographien tüjamujunscher Erze.* Zeits. Krist., **1927**, vol. 65, pp. 141–148, 6 figs.

A brief sketch is given of the deposit of radium ores at Tyuya-Muyun in Fergana [Min. Mag., vol. 20, p. 287]. Cut and polished sections were prepared of the complex secondary ores, and these were placed in contact with a photographic plate. The radiographs so obtained are compared with photographs of the same specimens. L. J. S.

Lunde (Gulbrand). *Über das Vorkommen des Platins in norwegischen Gesteinen und Mineralien. Beitrag zur Geochemie der Platinmetalle.* Zeits. anorg. Chem., **1927**, vol. 161, pp. 1–20.

The powdered rock (1 gr.) was fused with lead acetate, $KNaCO_3$, borax (2 gr. of each), and the metal bead cupelled. The resulting bead of silver and platinum was measured microscopically, then fused with borax to remove silver and again measured. Traces of platinum were found in a variety of basic rocks, nickel sulphide-ores, columbates, titanates, &c., the largest amount (0·0000074 %) in an olivine-rock and in hornblende-gabbro. Tantalite from Finland gave 0·000006 % Pt. L. J. S.

Sauce (Wilhelm de la). *Beiträge zur Kenntnis der Manganerzlagerstätte von Tschiaturi im Kaukasus.* Abh. prakt. Geol. Bergwirtsch., Band 8, Halle (W. Knapp), 1926, iv + 90 pp., 8 pls., 7 text-figs. Price 6·60 Mk.

A detailed account of the bedded deposits of manganese ore in Eocene sandstone at Chiaturi in govt. Kutais, Georgia. The ore consists of wad, psilomelane, and pyrolusite, and often shows an oolitic structure.

L. J. S.

Schornstein (Waldemar). *Die Rolle kolloider Vorgänge bei der Erz- und Mineral-Bildung insbesondere auf den Lagerstätten der hydrosilikatischen Nickelerze.* Abh. prakt. Geol. Bergwirtsch., Band 9, Halle (W. Knapp), **1927**, iv + 87 pp. Price 5 Mk.

A series of experiments bearing on the formation of nickel silicate ores by the weathering of serpentine, following on the lines of P. Kraft (M.A. **1**–274) and E. Dittler (M.A. **2**–216). L. J. S.

Hesemann (Julius). *Die devonischen Eisenerze des Mittelharzes.* Abh. prakt. Geol. Bergwirtsch., Band 10, Halle (W. Knapp), 1927, 56 pp., 2 pls., 25 text-figs. Price 3·50 Mk.

The iron-ores in Devonian limestone and in associated keratophyre and Schalstein around Elbingerode consist of chalybite, chamosite, magnetite, haematite, &c. These have been studied in polished sections by reflected light. It is suggested that the iron was given off as chloride during the submarine eruptions of keratophyre and diabase from a gabbroid magma. L. J. S.

Vogt (J. H. L.). *Magmas and igneous ore deposits.* Econ. Geol., 1926, vol. 21, pp. 207–233, 309–332, 469–497, 4 figs.

A general review and summary of the author's previous papers on ore-deposits formed by magmatic differentiation and by volatile emanations from the magma; with remarks on pyrohydatogen and hydrothermal ore-deposits. L. J. S.

Microscopical Examination of Opaque Minerals.

Orcel (J.). *Les méthodes d'examen microscopique des minerais métalliques.* Bull. Soc. Franç. Min., 1926, vol. 48 (for 1925), pp. 272–361, 5 pls. [Abbreviated in:] Revue de Métallurgie, Paris, 1926, vol. 23, pp. 537–551, 618–626, 1 col. pl., 5 text-figs.

A general review of the method of examining polished surfaces of opaque minerals in reflected (ordinary and polarized) light and of the chemical and other tests that may be applied [M.A. 1–197, 2–518]. A bibliography of 191 items is added. Some mixed ores from French localities are figured and described. Bornite from Madagascar, which on analysis gave the formula Cu_5FeS_4, was found to be perfectly homogeneous. L. J. S.

Bernauer (F.). *Zur Untersuchung von Erzen im auffallenden Licht.* Centralblatt Min., Abt. A, 1925, pp. 155–159, 2 figs.

Accessories for the metallographic microscope: (1) A totally-reflecting prism sliding into the microscope-tube and illuminated by a side mirror for vertical illumination. (2) A side tube giving in the eyepiece an image of a second object for direct comparison of colour, &c. L. J. S.

Thomson (Ellis). *A mineralographic study of germanite.* Univ. Toronto Studies, Geol. Ser., 1924, no. 17, pp. 62–65, pl. 2 (figs. 3–6).

Microscopical examination of polished sections of germanite [M.A. 3–59] from Tsumeb, South-West Africa, shows an intimate inter-

growth with other minerals. Analysis by E. W. Todd of material freed as far as possible from tennantite, enargite, galena and blende, but not from pyrite, gave: S 31·44, As 4·86, Ge 7·04, Cu 39·44, Fe 10·70, Zn 3·56, Pb 0·26, SiO_2 1·68, total 98·98. Pure germanite contains no iron, and the formula provisionally suggested for the mineral is $10Cu_2S.4GeS_2.As_2S_3$, with zinc replacing some of the copper. Samples of the powder used for analysis were embedded in sealing-wax and the proportion of the different minerals present determined micrometically on polished sections: germanite 77·3, pyrite 17·1 (extremes 13·1 and 24·9), tennantite 4·7, remainder 0·8 %. L. J. S.

Thomson (Ellis). *Mineralographic notes on certain arsenides and sulpharsenides of cobalt, nickel, and iron.* Univ. Toronto Studies, Geol. Ser., 1925, no. 20, pp. 54–58.

The white metallic minerals found in the Keeley mine, South Lorrain, Ontario, include cobaltite (CoAsS), skutterudite ($CoAs_3$), smaltite ($CoAs_2$), safflorite ($CoAs_2$), gersdorffite (NiAsS), chloanthite ($NiAs_2$), rammelsbergite ($NiAs_2$), mispickel (FeAsS), and löllingite ($FeAs_2$). The first two are usually crystallized, and the others usually massive and difficult to distinguish. Their microscopical characters as shown on polished surfaces and the action of reagents are noted. A. L. P.

Thomson (Ellis). *A re-examination of keweenawite.* Univ. Toronto Studies, Geol. Ser., 1925, no. 20, pp. 35–38, pl. 3 (fig. 2).

Microscopical examination of polished sections and chemical analysis of the original keweenawite (of G. A. Koenig, 1902) showed it to consist of domeykite (Cu_3As) 78 %, with niccolite, smaltite, chloanthite, and tennantite. Another specimen labelled as keweenawite was found to be a mixture of domeykite (39 %), niccolite (42 %), rammelsbergite, safflorite, and tennantite. A. L. P.

Geijer (Per). *On cubanite and "chalcopyrrhotite" from Kaveltorp.* Geol. För. Förh. Stockholm, 1924, vol. 46, pp. 354–355.

A metallographic examination of the original material described as 'chalcopyrrhotine' (C. W. Blomstand, 1870) from Kaveltorp, near Nya Kopparberg, Sweden, shows it to consist mainly of cubanite, with chalcopyrite, some pyrrhotine, and a little blende. The cubanite from the same locality analysed by G. Lindström in 1873 shows only a slight admixture of chalcopyrite and pyrrhotine. The name cubanite has priority over chalmersite. [Cf. M.A. 2–235–6.] L. J. S.

Frebold (Georg). *Beiträge zur Kenntnis der Erzlagerstätten des Harzes. I. Über magmatische und nichtmagmatische Erzausscheidungen im Gabbro des Radautales bei Harzburg.* Centralblatt Min., Abt. A, 1926, pp. 322–331, 6 figs.

—— *II. Über einige Selenerze und ihre Paragenesen im Harz.* Ibid., 1927, pp. 16–32, 3 figs.

—— *III. Über Berzelianit, Cu_2Se, und ein neues Vorkommen von „Selenkobaltblei" im Harz.* Ibid., 1927, pp. 196–199.

(I) Grains of pyrrhotine are common in the gabbro of the Radau valley, Harz, and masses the size of a man's fist are occasionally found. These are present not only in the gabbro itself but also in inclusions of other rocks in the gabbro. In the gabbro the order of formation was silicates, magnetite, pyrrhotine (with included spindles of pentlandite), chalcopyrite; whilst in the rock inclusions it was pyrite, pyrrhotine, magnetite, with some graphite earlier than the pyrrhotine.

(II) The selenium ores of the Harz when examined in polished sections showed as distinct minerals clausthalite (PbSe), tiemannite (HgSe), naumannite (Ag_2Se), and umangite (Cu_3Se_2). The characters of each of these are enumerated. Umangite, previously known only from Argentina, shows in polarized light a strong pleochroism, cherry-red to grey. The paragenesis of the minerals at each locality is described in detail.

(III) The reported occurrence of berzelianite (Cu_2Se) in the Harz, previously doubted by the author, is now confirmed, and its microscopical characters are stated. 'Selenkobaltblei', previously shown to be a mixture of clausthalite, cobaltite, &c., is recorded from the Trog valley. L. J. S.

Olsacher (Juan). *Über ein neues Vorkommen von Umangit.* Centralblatt Min., Abt. A, 1927, pp. 170–172.

Zorgite from Zorge, Harz, when examined in polished sections, is seen to consist of a mixture of three minerals; a rose-red pleochroic mineral identical with umangite [cf. preceding abstract], clausthalite, and in small amount a green birefringent mineral not yet identified. L. J. S.

Flörke (W.). *Zur polymorphie des CoAsS.* Centralblatt Min., Abt. A, 1926, pp. 337–338.

Crystals of cobaltite examined in reflected polarized light are seen to be anisotropic with twin-lamellae. They presumably represent paramorphs of orthorhombic after cubic material. Heated at about 850° C

and quickly cooled and re-polished the crystals are isotropic and remain so. L. J. S.

Short (M. N.) & Henderson (E. P.). *Tetradymite from Hachita, New Mexico.* Amer. Min., 1926, vol. 11, pp. 316–317.

Tetradymite occurs as blebs and seams with tourmaline and native gold in a quartz vein in the Little Mildred mine in the Little Hatchet Mts. Analysis, Te 43·66, Se nil, S 0·69, Bi 50·94, Fe 0·50, Mg trace, insol. 3·66 = 99·45, gives the formula Bi_2Te_3. Microscope tests on the polished surface are given. L. J. S.

Brown (W. Horatio). *A note on the occurrence of alaskaite.* Amer. Min., 1927, vol. 12, pp. 21–23, 1 fig.

The characters and micro-chemical reactions on polished surfaces of alaskaite are described. In addition to the original locality (the Alaska mine, Silverton, Colorado), the mineral is recorded from the adjoining Saxon mine. L. J. S.

Schwartz (G. M.). *Microscopic replacement versus injection in ores.* Amer. Min., 1927, vol. 12, pp. 297–304, 12 figs.

Micro-sections of various types of mixed ores are figured and discussed. Some clearly represent [pseudomorphous] replacement, but the evidence for the injection of ore-magma is less clear. The angularity and rounding of included fragments are contrasted. L. J. S.

Sampson (Edward). *Note on the determination of anisotropism in metallic minerals.* Econ. Geol., 1923, vol. 18, pp. 775–777.

With anisotropic metallic minerals in reflected light between crossed nicols the positions of extinction are not always at 90°, nor are the positions of greatest brightness always at 90°. This was demonstrated with sections of manganite; it is due to a rotation of about 5° of the plane of polarization, the rotation in alternate bright positions being opposite in direction [M.A. 1–199]. If the analyser be turned slightly from the crossed position, the differences in brightness are readily seen in an aggregate of crystals even without the Wright bi-quartz-wedge-plate [M.A. 1–199]. L. J. S.

Myers (W. M.). *Advantages of oblique illumination in mineragraphy.* Amer. Min., 1924, vol. 9, pp. 177–188, 10 figs.

The oblique illumination of opaque sections is effected with a Silverman illuminator. This consists of a filament electric lamp in the form of a circular tube fitting round the objective of the microscope. With suitable

switches it is easy to change from such oblique illumination to the ordinary vertical illumination. Oblique illumination shows the minerals in their normal colour and differentiates between gangue minerals and ore minerals; cavities, internal structures, and the relief brought out by grinding owing to differences in hardness are better shown. The different effects seen by the two methods are shown in a series of photomicrographs in pairs for a series of sections. L. J. S.

Miscellaneous.

Jirkovský (Rudolf). *Příspěvek k poznání českých sladkovodních travertinů se stanoviska biochemického.* [Contribution to the knowledge of Bohemian fresh-water travertines from a biochemical standpoint.] Rozpravy České Akad., 1926, vol. 35, no. 29, 13 pp.

Analyses are given of travertine from: I, Kosoř; II. Svatý Jan pod skalou; both in the Devonian limestone district between Prague and Beroun.

	CaO.	MgO.	MnO.	FeO.	Fe_2O_3.	Al_2O_3.	CO_2.	P_2O_5.	SO_3.	H_2O+ organ.	Moisture.
I.	52·03	0·63	0·02	0·28	0·94	0·25	41·63	0·23	0·10	1·40	0·37
II.	51·84	2·22	0·02	0·09	0·23	0·38	41·55	0·21	0·05	0·77	0·24

			Extracted by water.						
	Insol.	Total.	$Al_2O_3+Fe_2O_3$.	CaO.	MgO.	MnO.	SO_3.	Cl.	P_2O_5.	Total.
I.	2·50	100·42	0·02	1·85	0·39	0·20	0·05	0·09	trace	2·60
II.	2·81	100·41	0·01	1·81	0·62	0·33	0·04	0·08	trace	2·89

The material I was formed by the alga *Vaucheria geminata* and II by the moss *Hypnum commutatum*. In both cases the absence of aragonite was proved by Meigen's reaction. The author believes that the growth or cessation of growth of the travertine crusts is governed by the concentration of the calcium and magnesium ions in solution, and does not depend on the alkaline reaction of the plants. F. S.

[Solodovnikova (L. L.)] Солодовникова (Л. Л.). Эпидоты из контактовых месторождений восточных отрогов Кузнецкого Алатау в пределах Минусинского уезда Енисейской губ. *Les épidotes des gisements de contact du Kuznetskij Alatau dans le district de Minusinsk du gouvernement de Ieniseisk.* Труды Геол. Мин. Музея имени Петра Великого, Акад. Наук СССР (Trav. Musée Géol. Min. Pierre le Grand, Acad. Sci. URSS), 1926, vol. 5, pp. 233–268, 16 figs.

A detailed crystallographic description of epidote crystals collected by the authoress, together with an account of their paragenesis and of the

contact-rocks in which they occur. Material from the Durinsky mine gave analysis I of crystals and II of columnar masses.

	SiO_2.	Al_2O_3.	Fe_2O_3.	FeO.	MnO.	CaO.	H_2O.	Total.	Sp. gr.
I.	36·16	28·90	9·18	0·51	0·10	23·93	2·12	'100·32'	3·416
II.	37·47	27·37	9·92	0·58	0·30	22·62	1·95	100·21	3·435

These crystals are of three types, and on them 65 forms are noted including the new forms $\mathfrak{L}$ (332), γ ($\bar{7}22$), $\mathfrak{E}$ (410). Statistics of forms and tables of (ρ and ϕ) angles are given; $a:b:c = 1{\cdot}5810:1:1{\cdot}8059$, $\beta = 64°\,35'\,56''$. Crystals from the Kladbishchensky mine show 20 forms, $\mathfrak{A}$ (207) and $\mathfrak{H}$ (720) new, with $a:b:c = 1{\cdot}5766:1:1{\cdot}8027$, $\beta = 64°\,34'\,35''$. Crystals from Dinamitka show 12 forms with $a:b:c = 1{\cdot}5817:1:1{\cdot}80796$, $\beta = 64°\,35'\,45''$. Some other localities are mentioned. In all, five types of crystals are distinguished, which are characteristic of the different paragenetic groups. P. N. C.

[Boldyrev (A. K.)] Болдырев (А. К.). Кристаллографическое исследование чевкинита.—Boldyrev (A.). *Note crystallographique sur la tchevkinite.* Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1924, ser. 6, vol. 18, pp. 257–288, 2 pls., 9 text-figs.

Boldireff (A.). *Etude cristallographique de la tscheffkinite de l'Oural.* Bull. Soc. Franç. Min., 1925, vol. 48, pp. 120–127, 8 figs.

Crystals, collected by V. I. Kryzhanovsky in the Ilmen Mts., Ural, and proved by analysis to be tschewkinite (= chevkinite) [see following abstracts], were found to be monoclinic (not orthorhombic as given by A. Lacroix, 1915, and H. Ungemach, 1916, for tschewkinite from Madagascar). The crystals are tabular, parallel to (100), and somewhat elongated along the *b*-axis, and show the forms *T* (100), *P* (010), *i* (001), κ (20$\bar{1}$), *r* (10$\bar{1}$), *M* (101), *m* (201), η (110), *o* (111), ρ (112), *n* (11$\bar{1}$) [κ, *r*, and *n* being placed in the obtuse axial angle β], with $a:b:c = 2{\cdot}426:1:1{\cdot}955$, $\beta = 79°\,52'$. The crystals are sometimes twinned on (100). The optic axial plane is $\perp$ (010), $a:c = 11\frac{1}{2}°$ (or $25\frac{3}{4}°$) in the obtuse angle β; *n* 1·63–1·68, $\gamma - \alpha = 0{\cdot}0035$. 2V 78°, positive or negative; pleochroism strong, brown to red. Sp. gr. 4·53, hardness $5\frac{1}{2}$; colour black with pitchy lustre on the conchoidal fracture, streak brownish-black. A morphotropic relationship is shown between crystals of tschewkinite ($Si_3Ce_2CaO_{10}$) and those of orthite ($Si_2Al_2CaO_{10}AlCaHO_3$). P. N. C.

[Kaufman (L. E.)] Кауфман (Л. Э.). Химический состав чевкинита.—Kaufman (L.). *Sur la composition chimique de la tchevkinite.* Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1924, ser. 6, vol. 18, pp. 315–320.

Analysis of crystals of tschewkinite from the Ilmen Mts., Ural, described by A. K. Boldyrev [preceding abstr.] gave: SiO_2 19·22, TiO_2 17·22, ThO_2 0·80, Al_2O_3 3·86, Fe_2O_3 4·56, Yt_2O_3 1·25, Ce_2O_3 18·58, La_2O_3 &c. 22·70, FeO 7·24, MnO 1·34, CaO 3·34, Na_2O 0·42, K_2O 0·37, H_2O 0·67 = 101·57. Formula: $\frac{1}{2}(H,K,Na)_2O.2(Fe,Ca,Mn)O.2(La,Ce,Fe)_2O_3.6(Si,Ti)O_2$ or $R''_2\ R'''_4(Si,Ti)_4O_{16}.SiO_2$. P. N. C.

[Kryzhanovsky (V. I.)] Крыжановский (В. И.). Чевкинит из Ильменских гор.—Kryžanovskij (V.). *Sur la tchevkinite des Monts Ilmen.* Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1924, ser. 6, vol. 18, pp. 321–326.

Tschewkinite was first found in the Ilmen Mts., Ural, by G. Rose in 1839. An account is given of recent finds. P. N. C.

[Lodochnikov (V. N.)] Лодочников (В. Н.). Двойник и новая форма аксинита в албитофире Тарбагатая.—Lodotchnikov (V.). *Sur une mâcle et une forme nouvelle de l'axinite dans l'albitophyre du Tarbagataï.* Изв. Геол. Ком. (Bull. Com. Géol. Leningrad), 1925, vol. 38 (for 1919), pp. 545–559, 2 pls., 5 text-figs.

Lodočnikow (Wartan N.). *Ein Zwilling und eine neue Axinitfläche im Albitophyr des Tarbagatai.* Zèits. Krist., 1927, vol. 65, pp. 122–133, 1 pl., 7 text-figs.

Albitophyre occurring as dikes in the Tarbagatai Mts. [Semipalatinsk, Siberia] shows veins and nests of secondary axinite, epidote, actinolite, albite, &c. A minute (0·1 sq. mm.) crystal of axinite in one of the microsections has the appearance of a twin. From the optical orientation of the two portions, as determined on the Fedorov microscope stage, the twin-axis is deduced as [334] and the combination-plane as *M* (110). The 'new form' χ(313) forms the surface of contact between the axinite crystal and an adjoining grain of epidote. L. J. S.

Boldirew (A. K.). *Die chemischen Formeln des Nagyagits.* Centralblatt Min., 1924, pp. 193–201, 2 figs.

For nagyagite several formulae have been given by different authors. The atomic ratios given by the twelve published analyses of this mineral are plotted, and the series of curves gives an indication of which elements may be mutually replaceable. Another plot of the ratios [Pb + Au

(+Ag+Cu+Fe)]: [Te+S (+Se)+Sb], ranging from 1 : 1 to 1 : 1·94, suggests two compounds $\alpha\beta$ and $\alpha_2\beta_3$, with perhaps a third $\alpha\beta_2$. Taking into consideration the ratio Pb/Au = 9 to 5, further modifications of these formulae are suggested. L. J. S.

Quercigh (Emanuele). *Sulla bismutinite.* Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1925, ser. 6, vol. 1, pp. 33–37.

Needles of bismuthinite from a specimen labelled 'Bieber, Hessen' showed the forms (100), (010), (510), (310), (210), (320), (110), (340), (140), of which (510), (310), and (320) are new. The angle (110): $(1\bar{1}0)$ = 88° 57′ gives $a : b = 0{\cdot}9818 : 1$. Crystals prepared artificially by fusing Bi_2S_3 showed the forms (100), (010), (110), (120), (140), (111) and gave $a : b : c = 0{\cdot}985 : 1 : 1{\cdot}004$. [Cf. M.A. 3-562]. L. J. S.

Lugaro (Giulia). *Sulla bismutinite di St. Agnes* (*Cornovaglia*). Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1926, ser. 6, vol. 3, pp. 416–419.

A specimen labelled 'St. Agnes, Cornwall' consists of bundles of brilliant needles of bismuthinite with chalcopyrite and quartz. The bismuthinite needles show the forms (100), (010), (410), (310), (210), (320), (110), (450), (340), (230), (250), (130), (140), of which (450), (230), and (250) are new. The angle (010) : (110) = 45° 21′. Combinations of forms and their percentage frequency are listed. L. J. S.

Fenoglio (Massimo). *Pirargirite e proustite del Sarrabus* (*Sardegna*). Atti R. Accad. Sci. Torino, 1926, vol. 61, pp. 357–363, 3 figs.

Pyrargyrite as groups of crystals in calcite geodes is found sparingly in the Baccu Arrodas and Giovanni Bonu mines. The crystals are usually attached at one end; a doubly-terminated crystal showed the forms *m a e v t* [Dana's letters], and at the other end *e* $(10\bar{1}\bar{2})$ and *v* $(12\bar{3}\bar{1})$ Analysis gave Ag 59·61, Sb 22·24, As 0·15, S 17·89 = 99·89; sp. gr. 5·80. Proustite from the Baccu Arrodas mine shows the forms *m a e s v t*. Analysis gave Ag 65·35, As 14·99, S 19·49 = 99·83; sp. gr. 5·61. L. J. S.

Onorato (E.). *Sulla hauerite di Raddusa.* Atti (Mem.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1925, ser. 6, vol. 1, pp. 470–479, 6 figs.

A series of about 100 crystals of hauerite from Raddusa, Sicily, showed the forms (111), (100), (210), (221), (321), (421), the last being new for the species. Octahedra and cubo-octahedra predominate. The

crystals are dull and black with a reddish or violet tinge due to surface alteration to manganese sulphate or oxide; but on a fresh fracture the material is lead-gray with metallic lustre. Aggregates of crystals are described, and on the cubic cleavage there are indications of radial growth. Analysis gave Mn 46·28, S 53·51 = 99·79; sp. gr. 3·30 and 3·41.

L. J. S.

Onorato (E.). *Sulla epsomite della miniera nord-ovest inferiore di Idria.* Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1925, ser. 6, vol. 2, pp. 204–209.

Five analyses are given of fibrous epsomite from the mercury mines at Idria [now in Istria, Italy]. They show FeO nil to 4·68% (indicating an isomorphous mixture of up to 18% $FeSO_4.7H_2O$ with the $MgSO_4.7H_2O$), with range in sp. gr. from 1·675 to 1·713. The mineral has been formed by the action of ferrous sulphate, derived from decomposing pyrite, on the Triassic dolomite. L. J. S.

Arsandaux (H.). *Sur la chromite du Mont Djéti, cercle d'Atakpané (Togo).* Bull. Soc. Franç. Min., 1925, vol. 48, pp. 70–76.

Blocks of compact chromite occur in serpentine intrusive into micaceous quartzite and amphibolite. Associated are talc and magnesite, and scales of chrome-chlorites [M.A. 3–57]. Analysis by Raoult gave SiO_2 0·88, Cr_2O_3 44·56, Al_2O_3 21·70, Fe_2O_3 6·93, FeO 8·51, MnO 0·23, MgO 16·65, CaO 0·78, loss on ignition 0·09, moisture 0·02 = 100·35. This composition, $(Cr, Al, Fe)_2O_3.(Mg, Fe, Mn)O$, indicates a chromiferous ferropicotite on the border line between picrochromite and spinel but with some ferric iron. (Cf. E. S. Simpson, Min. Mag., vol. 19, p. 102.) L. J. S.

Lacroix (A.). *Le gisement de la thorianite à Madagascar.* Bull. Soc. Franç. Min., 1925, vol. 48, pp. 236–237.

Thorianite (sp. gr. 9·095), as small bright cubes with (111) and rarely (311), has been found in alluvial deposits near Andolobe in the south of Madagascar. The crystals enclose scales of phlogopite, and it is therefore suggested that they were perhaps derived from the limestones or the pyroxenites of the region. L. J. S.

Aubel (René van). *Sur la présence d'uraninite cristallisée dans les gîtes uranifères de Kasolo (Katanga).* Compt. Rend. Acad. Sci. Paris, 1927, vol. 185, pp. 586–588.

Cubes (4 mm.) of uraninite with faces (111) and (110) were found with granular pitchblende in brecciated dolomite. One crystal is an inter-

penetration twin of the fluorite type. Cubes were also found embedded in green and orange alteration products of pitchblende. L. J. S.

Patte (Etienne). *Sur la presence du diaspore dans des roches anciennes latériformes du Tonkin.* Bull. Soc. Franç. Min., 1925, vol. 48, pp. 116–119.

Crystals of diaspore were detected microscopically in a lateritic rock, and chemical analysis (made on material washed free from clay) showed 74·6% diaspore. The diaspore was no doubt derived from gibbsite, since the rock shows the effects of mechanical deformation. L. J. S.

Orcel (J.). *Sur un type particulier de phlogopite pauvre en fer.* Bull. Soc. Franç. Min., 1926, vol. 48 (for 1925), pp. 362–366, 1 pl.

Large (up to 20 cm. across) hexagonal plates of a clear olive-green colour and beautifully zoned, from Snake Creek, Wasatch Co., Utah, have been sold as muscovite or pennine. Although the material is not elastic, the optical constants (ϵ_D 1·5529, ω_D 1·5910) are those of a mica rather than a chlorite. Analysis, SiO_2 40·56, TiO_2 0·10, Al_2O_3 14·63, Fe_2O_3 1·14, FeO 0·41, MnO 0·08, CaO 0·07, MgO 27·37, Na_2O 0·20, K_2O 10·73, F (0·05), loss on ignition 4·68 = 99·98, agreeing closely with the formula $3\frac{1}{2}H_2O.1\frac{1}{2}K_2O.9MgO.2Al_2O_3.9SiO_2$, proves the mineral to be phlogopite. L. J. S.

Parker (Robert L.). *Alpine Minerallagerstätten.* Schweiz. Min. Petr. Mitt., 1923, vol. 3, pp. 298–348, 3 figs.

Campbell (Ian). *Alpine mineral deposits.* Amer. Min., 1927, vol. 12, pp. 157–167, 1 fig.

A general review is given of the work of J. Koenigsberger and others on the occurrence of crystallized minerals in rock crevices in the Alps, representing a special type of 'Alpine mineral deposits' distinct from the few mineral deposits of economic value in Switzerland (a short review of the latter is also given). The small crevices or lenses lie across the foliation of the enclosing schists and gneisses, and the nature of their contents depends on the enclosing rock. Surrounding the crevices is a zone of altered (leached) rock, the width of which varies with the size of the crevice; next is a zone of quartz, followed by the crystallized minerals; and in the interior there may be water and chlorite. The minerals in the crevices have the same chemical composition as the surrounding rocks from which they have evidently been derived by lateral secretion. A diagram shows the order of crystallization of the various minerals with

falling temperatures of the solution, the range being from about 500° to 130° with a maximum deposition at about 350° C. The results of experiments on the hydrothermal synthesis of quartz and silicates are tabulated and the products compared with the minerals found in the Alpine crevices. Under the second title is given an abstract of Parker's paper. L. J. S.

Ahlfeld (F.). *Sobre un nuevo hallazgo de canfieldita.* Revista Minera de Bolivia, 1927, vol. 2, p. 158.

A rich concentration of ore found in 1921 in the Gallofa vein at Colquechaca, Bolivia, consisted of blende, galena, pyrite, mispickel, marcasite, native silver, much pyrargyrite, stephanite, vivianite, with quartz, calcite, and dolomite, also in considerable quantity a mineral at first thought to be argentite. The last has since been determined to be canfieldite ; it forms compact masses and crystals, often twinned, up to 2 cm. across. L. J. S.

Koechlin (R.). *Über Turnerit aus dem Floitentale in Tirol.* Ann. Naturhist. Hofmus. Wien., 1920, vol. 33 (for 1919), pp. 1–8, 2 figs.

Almost colourless to yellowish crystals (2 mm.) of monazite, with albite, adularia, apatite, anatase, &c., on granite-gneiss, are tabular parallel to $a(100)$ with the forms $abclmgeuwxrzivto$ [Dana's letters], $\rho(\bar{1}03)$, and new $\chi(11.0.1)$?, $\epsilon(\bar{2}03)$, $\tau_1(\bar{5}16)$, $\tau_2(\bar{5}17)$. χ is a rounded face from (901) to (12.0.1). As in other Alpine monazites there is a perfect b cleavage, and for this reason it is proposed to retain the name 'turnerite', as distinct from monazite showing c and a cleavages. L. J. S.

Hess (Frank L.) & Henderson (E. P.). *Polycrase from Brazil.* Journ. Franklin Inst., 1925, vol. 200, pp. 235–238.

Minerals of the euxenite-polycrase group have been found in some quantity (15 tons) in pegmatite on the Santa Clara estate near Tocantins (21° 10′ S., 40° 45′ W.), as lumps (up to 16 kg.) and rough crystals [M.A. 1–24, 3–296]. The fragments analysed were semi-translucent and dark reddish-brown ; refr. index 2·248. Analysis gave Nb_2O_5 (incl. little Ta_2O_5) 20·31, TiO_2 34·41, Yt and Ce earths 29·28, ThO_2 5·22, U_3O_8 6·48, PbO 0·64, Fe_2O_3 0·78, Al_2O_3 0·44, H_2O 2·04 = 99·60. The ratio $Nb_2O_5 : TiO_2 = 1 : 5{\cdot}5$ indicates that the mineral belongs to the polycrase end of the series. The age is given doubtfully as 546 million years. L. J. S.

Ellsworth (H. V.). *Euxenite-polycrase from Mattawan township, Nipissing district, Ontario.* Amer. Min., 1926, vol. 11, pp. 329–331.

This mineral was found in a pegmatite dike quarried for felspar. It is black with brilliant sub-conchoidal fracture; in splinters brown and optically isotropic; sp. gr. 4·918, H. $6\frac{1}{2}$. It is very fresh, and the small amount of silica suggests that it has lost no constituents (notably lead) by leaching. The Pb : U + Th ratio gives the age as 1180 million years. The ratio $Nb_2O_5 + Ta_2O_5 : TiO_2 = 1 : 3{\cdot}3$ indicates that the mineral is on the border-line between euxenite and polycrase. Analysis gave Nb_2O_5 18·49, Ta_2O_5 12·12, TiO_2 26·17, SiO_2 0·03, ZrO_2 0·03, SnO_2 0·09, ThO_2 0·97, UO_2 6·42, UO_3 0·43, PbO (mol. wt. 222) 1·06, $(Ce, La, Di)_2O_3$ 0·20, $(Yt, Er)_2O_3$ 28·07, FeO 0·29, Fe_2O_3 1·40, MnO 0·03, $Al_2O_3 + BeO$ 0·28, CaO 1·08, MgO 0·05, F nil, $H_2O(-110°)$ 0·64, $H_2O(+110°)$ 2·83, He n. d., total 100·08. L. J. S.

Ellsworth (H. V.). *A new analysis of the Maberly, Ontario, Euxenite.* Amer. Min., 1927, vol. 12, pp. 365–367.

The earlier analysis of euxenite from near Maberly in South Sherbrooke township, Lanark Co. [M.A. 1–73, 1–338], gave a very low Pb/U + 0·38 Th ratio. A new analysis, made on an average sample from a large lot of material gave: Nb_2O_5 22·28, Ta_2O_5 5·32, TiO_2 25·04, SiO_2 1·08, ThO_2 2·64, ZrO_2 nil, SnO_2 0·14, UO_2 7·25, UO_3 1·51, PbO 1·01, $(Ce, La, Di)_2O_3$ 0·87, $(Yt, Er)_2O_3$ 24·95, Al_2O_3 0·45, Fe_2O_3 2·16, FeO 0·14, MnO 0·19, BeO 0·05, MgO 0·07, CaO 2·03, $H_2O(-110°)$ 0·08, $H_2O(+110°)$ 2·29, total 99·55; sp. gr. 4·983. This gives the ratio Pb/U + 0·38 Th = 0·11, corresponding to an age of 870 million years. This is still lower than the average (1100–1200 million years) given by other minerals in the pre-Cambrian of Ontario. The euxenite has therefore perhaps been leached to a certain extent, as suggested also by its minute fissuring and the presence of silica. L. J. S.

Ellsworth (H. V.). *Ellsworthite crystals from Haliburton County, Ontario.* Amer. Min., 1927, vol. 12, pp. 48–53, 1 fig.

Small crystals of rounded octahedral habit, with (111), (100), (110), (311), have been found in a 'vein-dike' of igneous calcite in Cardiff township. They are brownish-black with brilliant adamantine lustre and sub-conchoidal fracture; powder pale yellow, sp. gr. 3·705, H. $4\frac{1}{2}$. Analysis gave: Nb_2O_5 23·44, Ta_2O_5 9·97, TiO_2 15·06, SiO_2 2·49, ZrO_2 0·00, ThO_2 0·10, SnO_2 0·06, PbO 1·73, UO_2 1·56, UO_3 20·46,

$(Ce, La, Di)_2O_3$ 1·49, $(Yt, Er)_2O_3$ 0·12, Al_2O_3 0·12, Fe_2O_3 2·74, FeO 0·22, MnO 0·04, BeO 0·02, CaO 8·94, MgO 0·08, H_2O (110–130°) 4·59, H_2O (+130°) 6·61, insol. 0·21, P_2O_5, F traces, total 100·05. This agrees approximately with the analysis of the original ellsworthite [M.A. **2**–248], and with one of the three analyses of betafite from Madagascar. It is suggested that two different minerals have been included under betafite.

L. J. S.

Ellsworth (H. V.) & Walker (John F.). *Knopite and magnetite occurrence, Moose creek, southeastern British Columbia.* Sum. Rep. Geol. Survey Canada, 1926 (for 1925), pt. A, pp. 230 A–232 A.

Knopite, a mineral new to Canada, occurs sparingly in small bunches in a basic pegmatite, composed of hornblende, biotite, and magnetite, at Moose creek near Leanchoil. Under the microscope, the small grains are dark brown and almost opaque; polished surfaces examined in reflected light show an intimate intergrowth with magnetite. Material separated as far as possible from magnetite and silicates gave on analysis: SiO_2 2·17, TiO_2 54·49, Al_2O_3 0·68, Fe_2O_3 (incl. FeO) 2·85, Ce, &c., oxides 2·33, Yt, &c., oxides 0·05, ThO_2 0·06, MnO 0·08, MgO 0·21, CaO 35·10, Na_2O 0·46, K_2O 0·07, SnO_2 0·04, H_2O 0·68 = 99·27. This analysis suggests that knopite is a ceriferous perovskite. Another specimen from the same locality is brown and more translucent, and appears to be perovskite.

L. J. S.

Winchell (A. N.). *Isotropic quartz.* Amer. Min., 1924, vol. 9, pp. 235–237, 2 figs.

A micro-section of a rock from the Bates iron mine, Iron River, Michigan, shows quartz with much optically-isotropic material (n 1·54). The latter when examined by X-ray methods gave the spectrum of quartz. The material is evidently so minutely crystalline that its birefringence is not noticeable. It is of the nature of chert. L. J. S.

Gordon (Samuel G.). *The probable identity of gageite with tephroite.* Proc. Acad. Nat. Sci. Philadelphia, 1927, vol. 79, pp. 207–208.

The chemical composition, optical data, colour, and crystal angles of 'gageite' (A. H. Phillips, 1910) suggest the identity with tephroite.

L. J. S.

Greig (J. W.). *Formation of mullite from cyanite, andalusite, and sillimanite.* Amer. Journ. Sci., 1926, ser. 5. vol. 11, pp. 1–26, 18 figs. [See M.A. **3**–52.]

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